



AEROSPACE MEDICINE AND BIOLOGY

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A CONTINUING BIBLIOGRAPHY

WITH INDEXES

(Supplement 171)

SEPTEMBER 1977

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

ACCESSION NUMBER RANGES

Accession numbers cited in this Supplement fall within the following ranges:

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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 171)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in August 1977 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA)*.



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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 186 reports, articles and other documents announced during August 1977 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

Two indexes -- subject and personal author -- are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1977 Supplements.

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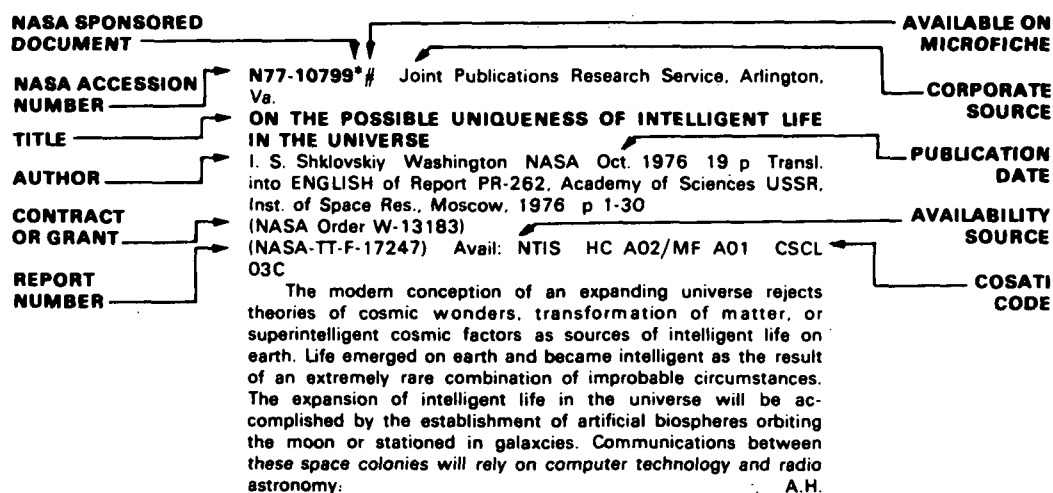
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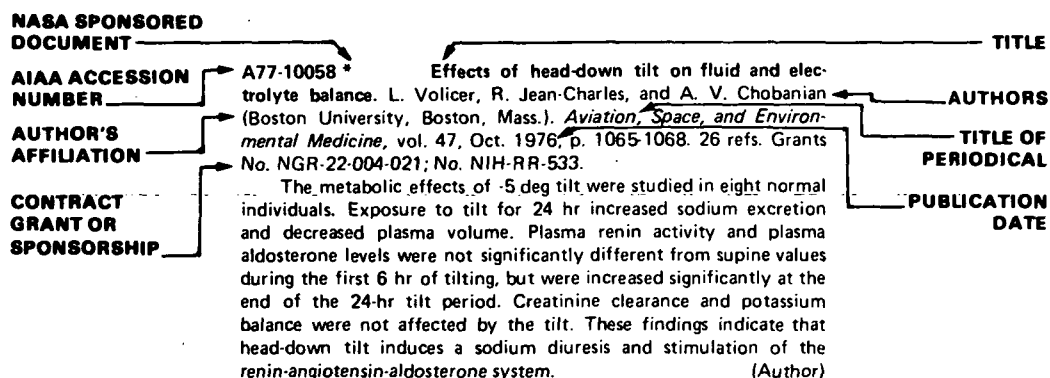
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TYPICAL CITATION AND ABSTRACT FROM IAA



AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 171)

SEPTEMBER 1977

IAA ENTRIES

A77-33916 # Fluid dynamics in bioengineering (Fluidodinamica in bioingegneria). C. Ferrari (Torino, Politecnico, Turin, Italy). *Torino, Accademia delle Scienze, Classe di Scienze Fisiche, Matematiche e Naturali, Atti*, vol. 110, Jan.-June 1976, p. 39-52. 24 refs. In Italian.

A general review is presented of problems of hemodynamics, or blood flow throughout the cardiovascular system. Attention is given to capillary flow, the propagation of pressure waves in the blood, the elastic properties of vessel tissues, flow in the arteries, and the motion of red blood cells. B.J.

A77-34042 * Parameters for assessing vibration-induced cardiovascular responses in awake dogs. A. Bhattacharya, E. P. McCutcheon (NASA, Ames Research Center Biomedical Research Div., Moffett Field, Calif.; Wenner Gren Aeronautical Research Laboratory; Kentucky, University, Lexington, Ky.), C. F. Knapp, and R. G. Edwards (Wenner Gren Aeronautical Research Laboratory; Kentucky, University, Lexington, Ky.). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 42, May 1977, p. 682-689. 18 refs. Contract No. F44260-74-C-0012.

A77-34043 Changes in plasma glucose, FFA, corticosterone, and thyroxine in He-O₂-induced hypothermia. L. C. H. Wang and R. E. Peter (Alberta, University, Edmonton, Canada). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 42, May 1977, p. 694-698. 29 refs. Defence Research Board of Canada Grant No. 9310-150.

A77-34044 Influence of body position on dynamic compliance in young subjects. H. Sasaki, W. Hida, and T. Takishima (Tohoku University, Sendai, Japan). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 42, May 1977, p. 706-710. 23 refs.

We studied the effect of a postural change from the erect to the supine position on the unevenness of pulmonary ventilation in six normal subjects. Dynamic compliance (C_{dyn}) was measured in seated and supine postures at functional residual capacity (FRC) and also while the seated subjects maintained end-expiratory lung volume at the level of supine FRC. Frequency dependence of C_{dyn} increased relative to that measured in the seated position at FRC when the subject remained seated but decreased his lung volume, or when he assumed the supine posture. There was no significant difference between C_{dyn} measured in the supine posture and in the seated at supine FRC. We conclude that the increased frequency dependence seen in the supine posture is largely attributed to the associated decrease of lung volume rather than the position per se. (Author)

A77-34045 Effects of plasma ascorbic acid levels on heat acclimatization in man. H. F. Kotze, W. H. van der Walt, G. G. Rogers, and N. B. Strydom (Chamber of Mines of South Africa, Industrial Hygiene Div., Johannesburg, Republic of South Africa). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 42, May 1977, p. 711-716. 13 refs.

Out of a group of thirteen male volunteers who were gradually heat acclimatized over a period of 10 days, four received an oral dose of 250 mg ascorbic acid, five received 500 mg ascorbic acid, and the rest received placebos before each heat exposure. In the subjects who received ascorbic acid, whether 250 or 500 mg, the total circulating plasma ascorbic acid increased over the first 3-4 days, reaching a plateau about four times higher than in the subjects taking placebos. The ascorbic acid was shown to decrease rectal temperature independently of associated variations in total sweat output, plasma volume, and time. Increased ascorbic acid concentration was associated with a reduction in total sweat output, independent of rectal temperature. Ascorbic acid may therefore be effective in reducing heat strain. P.T.H.

A77-34046 Effect of high-altitude exposure for 10 days on stroke volume and cardiac output. R. S. Hoon, V. Balasubramanian, O. P. Mathew, S. C. Tiwari, S. C. Sharma, and K. S. Chadha (Directorate General, Armed Forces Medical Services, New Delhi, India). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 42, May 1977, p. 722-727. 35 refs. Research sponsored by the Armed Forces Medical Research Committee of India.

Resting stroke volume and cardiac output of 50 normal healthy sea-level residents (group A) were estimated by the noninvasive technique of electrical impedance plethysmography. They were then airlifted to an altitude of 3,658 m and serial estimations carried out at 0-4 h and 5-8 h and on the 2nd, 3rd, 4th, 5th, and 10th days. The subjects were brought back to sea level and studied for up to 5 days. Thirty permanent residents of high altitude (group B) and sixteen lowlanders temporarily resident at high altitude (group C) were also subjected to similar studies. It was found that resting stroke volume and cardiac output of group A started falling immediately on arrival at high altitude, reached the minimum on the 3rd day, and tended to improve on the 4th and 5th day, but showed a secondary fall on the 10th day. On return to sea level the cardiac output normalized immediately, the stroke volume on the 2nd day. At sea level group A had values similar to group B and at high altitude to group C.

-(Author)-

A77-34047 Urinary catecholamine excretion on induction to high altitude /3,658 m/ by air and road. R. S. Hoon, S. C. Sharma, V. Balasubramanian, and K. S. Chadha (Directorate General, Armed Forces Medical Services, New Delhi, India). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 42, May 1977, p. 728-730. 8 refs.

Increased sympathetic activity was found to occur in symptomatic lowlanders rapidly exposed to an altitude of 3,658 m. Subjects who reached the same altitude after considerably slower ascent remained symptom-free and did not show increased sympathoadrenal activity. The findings support the existence of a relationship between increased sympathoadrenal activity and high-altitude illness. P.T.H.

A77-34048 Correction of water content and solute concentration in blood during hemoconcentration. Y. Ohira, A. Ito, and S. Ikawa (Jikei University Hospital, Tokyo, Japan). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 42, May 1977, p. 739-743. 21 refs.

Eleven trained and healthy male volunteers aged 19-28 yr performed a maximal leg exercise on a bicycle ergometer, and various parameters of hemoconcentration were recorded in blood and urine samples before and after exercise. Both serum total protein and hematocrit were found to have a high correlation with both serum and blood water content, and the coefficient of correlation between serum specific gravity and serum water was high before and after exercise. Considerations of reliability, however, lead to serum total protein as the best parameter for calculating water content and actual decrease in water volume in the blood due to exercise. P.T.H.

A77-34049 Adaptations to endurance training at three intensities of exercise. G. L. Dohm, G. R. Beecher, T. P. Stephenson, and M. Womack (East Carolina University, Greenville, N.C.; U.S. Department of Agriculture, Nutrition Institute, Beltsville, Md.). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 42, May 1977, p. 753-757. 25 refs.

Rats were trained on three treadmill running schedules: 20 m/min, 27 m/min, and 35 m/min for 1 h/day. After 6 wk, lean body mass and body fat content were decreased to the same extent in all three trained groups. Thus, exercise appears to lower body fat by some mechanism that is not related to the amount of energy expended during exercise. Heart and adrenal gland weight-to-lean body mass ratios were increased by training. Heart weight-to-lean body mass ratio increased with increasing intensity of exercise but the adrenal weight-to-lean body mass ratio was independent of exercise intensity. Training increased muscle succinate dehydrogenase activity to the same extent in all three trained groups which suggests that the adaptation in respiratory capacity is not altered greatly by the intensity of training. (Author)

A77-34050 Evaporation of sweat from sedentary man in humid environments. L. G. Berglund and R. R. Gonzalez (Yale University, New Haven, Conn.). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 42, May 1977, p. 767-772. 19 refs. Grant No. NIH-ES-00354.

A77-34051 Human amino acid excretion during and following an extended airborne alert. B. O. Hartman, J. P. Ellis, Jr., J. B. Garcia, Jr., and R. R. Bollinger (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aviation, Space, and Environmental Medicine*, vol. 48, May 1977, p. 395-398. 6 refs.

The urinary excretion of free amino acids was measured in 15 men who participated in a continuous airborne alert for an extended period of time. These men made up one of three teams which took turns so as to assure that at least one team remained airborne in an EC-135 aircraft at all times during the 96-h alert. The team making up the test group herein reported was airborne for 8.5 h on each of four successive days; flights were flown during the daytime. The data strongly suggest that the participants experienced anticipatory stress during the early part of the first two flight days of the alert, after which the excretion of amino acids was virtually unaltered. Additionally, amino acid excretion during the 24-h period following the alert was essentially in accord with baseline values established for another groups of subjects. (Author)

A77-34052 Recurrent heat exposure - Effects on levels of plasma and urinary sodium and potassium in resting and exercising men. R. Francesconi, J. Maher, G. Bynum (U.S. Army, Army Research Institute of Environmental Medicine, Natick, Mass.), and J. Mason (U.S. Army, Walter Reed Army Institute of Research, Washington, D.C.). *Aviation, Space, and Environmental Medicine*, vol. 48, May 1977, p. 399-404. 18 refs.

A77-34053 Catecholamine excretion in T-37 flight training. G. S. Krahenbuhl, J. R. Marett, and N. W. King (Arizona State University, Tempe, Ariz.). *Aviation, Space, and Environmental Medicine*, vol. 48, May 1977, p. 405-408. 22 refs. Contract No. F41609-75-C-0028.

Catecholamine excretion was determined for eight USAF student pilots during three basal and four T-37 training conditions. When viewed as the dependent variable, catecholamine excretion patterns support the conclusion that the Basic Cockpit Training Emergency Procedures unit was not stressful. The remaining lesson units, including Power-on-Stall and Spin-Recovery, First Solo, and Instrument Check lesson units, resulted in a pronounced stress response. When catecholamine excretion data were interpreted for psychological significance, it was concluded that the lesson unit which included Power-on Stalls and Spin-Recoveries created the highest arousal, anxiety and apprehension. Student pilot observations supported this interpretation. The relative excretion of epinephrine and norepinephrine showed changes accompanying pilot training which may be interpreted as demonstrative of successful coping behavior. (Author)

A77-34054 Theoretical analysis of altitude tolerance and hemoglobin function. J. R. Neville (U.S. Army, Letterman Army Institute of Research, Presidio of San Francisco, Calif.). *Aviation, Space, and Environmental Medicine*, vol. 48, May 1977, p. 409-412. 30 refs.

The potential effect of changes in the position and shape of the oxyhemoglobin dissociation curve (ODC) in modifying altitude tolerance is quantitatively analyzed and discussed. The most frequently used criteria for oxygen affinity, the position or P-50 of the ODC (oxygen pressure at 50% saturation) is shown to have slight influence on tissue oxygenation in terms of arteriovenous oxygen difference under steady-state, hypoxic-hypoxia conditions. Conversely, changes in the shape of the curve, also expressed as the cooperativity or heme-heme interaction, could substantially modify oxygen transport under these conditions. Published observations are reviewed which suggest that hemoglobin cooperativity is not normally invariant. (Author)

A77-34055 Increased responsiveness of heart rate to B-adrenergic stimulation in cold-adapted rats. M. J. Fregly, B. J. Kaplan, and P. E. Tyler (Florida, University, Gainesville, Fla.). *Aviation, Space, and Environmental Medicine*, vol. 48, May 1977, p. 413-417. 20 refs. Contract No. N00014-75-C-0199.

A77-34056 Fluorescein angiography and light microscopy studies of retinas irradiated by oxygen nuclei. C. H. Bonney, R. E. Schmidt, D. M. Hunter, and G. E. Conley (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aviation, Space, and Environmental Medicine*, vol. 48, May 1977, p. 418-423. 8 refs.

Fluorescein angiography and light microscopy techniques were used in the rhesus monkey to evaluate retinal damage following oxygen ion irradiation. Early evidence of retinal vascular damage was demonstrated through the use of the fluorescein angiograms. At the light microscopy level, there was no clear demonstrable change in the retinal vasculature which could be correlated with the retinal leakage noted on the angiograms. B.J.

A77-34057 * Effect of 30 months in a locked environment on the microbial flora of dogs. E. Balish, C.-N. Shih, C. E. Yale, and A. D. Mandel (NASA, Ames Research Center, Moffett Field, Calif.; Wisconsin, University, Madison, Wis.). *Aviation, Space, and Environmental Medicine*, vol. 48, May 1977, p. 424-431. 15 refs. Grant No. NGR-50-002-091.

It has been proposed that the microbial flora of mammals would simplify to a few microbial species if the host animal was confined to a 'locked' environment and provided with sterile food, water, and air.

This paper updates information on the microbial profile (feces, nose and throat) of purebred beagles housed in the above-mentioned conditions through a 30-month study period and demonstrates that no drastic decrease or simplification of the microbial profile occurred in isolated or control dogs. B.J.

A77-34058 * **Comparative orthostatic responses - Standing vs. head-up tilt.** D. H. Spodick (St. Vincent Hospital; Massachusetts, University, Worcester; Tufts University; Boston University, Boston, Mass.) and V. Q. Lance (Massachusetts, University, Worcester, Mass.). *Aviation, Space, and Environmental Medicine*, vol. 48, May 1977, p. 432, 433. 9 refs. Grant No. NGR-22-012-026.

In both physiologic and clinical studies, standing is often loosely equated with head-up tilt (HUT) although the cardiovascular effects of these variants of orthostasis have not been formally compared, except for heart rate. The effects of HUT and standing were measured noninvasively in male volunteers satisfying identical criteria for age and normal status. In both postures, there were significant increases in heart rate, pre-ejection period, isovolumic contraction time, and the ratio of pre-ejection to ejection period, and significant decreases in ejection period and ejection time index. All of these changes were greater for standing than for tilt. Pulse transmission time changed significantly (-14%) only with tilt. We conclude that head-up tilt and standing are rather comparable but not physiologically identical forms of orthostasis. (Author)

A77-34059 **Effects of alcohol on human accommodation.** J. Levett and L. Karras (Rush-Presbyterian-St. Luke's Medical Center, Chicago, Ill.). *Aviation, Space, and Environmental Medicine*, vol. 48, May 1977, p. 434-437. 14 refs. Grant No. PHS-1-R01-AA-02156-01.

A study was conducted to determine the effect consumption of ethyl alcohol has upon the accommodation response time of the lens in the human eye. Each subject was given an alcoholic beverage and his ability to accommodate was monitored for levels of blood alcohol in the range of 50 mg of ethanol/100 ml of blood to 100 mg/100 ml. It was found that the accommodation response times were increased by 10-30% over controls. B.J.

A77-34060 **Altitude tolerance in rats in relation to carbohydrates and fats in their diet.** T. Purshottam, U. Kaveeshwar, and H. D. Brahmachari (Defence Research Development Establishment, Gwalior, India). *Aviation, Space, and Environmental Medicine*, vol. 48, May 1977, p. 438-442. 18 refs.

Rats were exposed to simulated altitudes of 3658, 4877, and 7620 m, 5 h/d for 30 d, at ambient temperature of 28 C. Voluntary food intake, growth rate, and survival time were measured under effects of commercial diet (50% CHO, 4% fat and 24% protein), high fat diet (52% fat), and high carbohydrate diet (75% CHO). The results showed that altitude-exposed rats on high CHO diet had improved growth rate, but lowered survival time on their subsequent exposure (at the end of a 1-month period) to severe hypoxia (5% oxygen). The animals on high fat diet had very poor growth rate. These rats, however, had tremendously increased resistance to severe hypoxia (survival time exceeding 60 min as compared with less than 12 mins for those on commercial or high CHO diet). (Author)

A77-34061 **Relative biological effectiveness /RBE/ of heavy ions /O.⁺8/ for producing retinal lesions.** C. H. Bonney, K. A. Hardy, D. M. Hunter, and G. E. Conley (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aviation, Space, and Environmental Medicine*, vol. 48, May 1977, p. 443-445. 13 refs.

It is found that the relative biological effectiveness for oxygen ions (250 MeV/nucleon) for producing an ischemic retinal lesion in the rhesus monkey is greater than 10. The biological endpoint noted following oxygen ion exposure was leakage of fluorescein at 24 h postexposure, followed by an ischemic retinal lesion within one week. B.J.

A77-34062 **Actions of cholinergic agonist and antagonists on the adrenocortical response of basal, hypoxic, and hypercapnic rats.** S. F. Marotta and N. Sithichoke (Illinois, University, Chicago, Ill.). *Aviation, Space, and Environmental Medicine*, vol. 48, May 1977, p. 446-450. 22 refs. NR Project 201-020.

Cholinergic neuronal influences on the function of male rat's hypothalamo-hypophyseal-adrenocortical (HHA) system both during basal and stressful situations (hypoxia and hypercapnia) were investigated using a cholinergic agonist (eserine) and antagonists (atropine, methyl atropine, mecamylamine and 4-(1-naphthylvinyl) pyridine). The results indicate that the transmitter, acetylcholine (ACh), plays a partial role in the regulation of the HHA system. The muscarinic (m) effects of ACh were stimulatory peripherally and inhibitory centrally. The nicotinic (n) effects were stimulatory and possibly affected the HHA system by inhibiting the central m-inputs. The cholinergic regulation of the HHA system for both non-stressed and hypercapnic animals is probably mediated via a common nm-cholinergic pathway. (Author)

A77-34063 **Two years of routine patient movement in the U.S.A. /Jan. 1974-Dec. 1975/.** A. Johnson, Jr. (USAF, Aeromedical Services, Scott AFB, Ill.). *Aviation, Space, and Environmental Medicine*, vol. 48, May 1977, p. 451-453.

The DOD Regulation 4515.13-R states that a routine patient will be delivered to the destination hospital within 72 h after pickup from aerial ports or from the originating medical facility in the Continental United States. A review of records of routine patient movement of the Continental United States from January 1974 through December 1975 shows that 102,547 routine patients were aeromedically evacuated from an originating medical facility to a destination hospital. Within the 72-h DOD criteria, 93% of the patients were delivered to a destination hospital. B.J.

A77-34064 **Cambodian airlift.** R. B. Rayman (USAF, Clark AFB, Philippines). *Aviation, Space, and Environmental Medicine*, vol. 48, May 1977, p. 460-464. 18 refs.

The paper is concerned with fatigue as a potential medical problem for five flightcrews that flew an extremely difficult schedule from January 13 to March 13, 1975, airlifting supplies and ammunition to Cambodia. The flight surgeon monitored the men by subjective evaluation, several physiological and hematological measurements, and anonymous questionnaires. Some recommendations are made for flightcrews flying emergency airlift operations in the future. B.J.

A77-34065 **Physicians and airline medical emergencies.** M. B. Hays (California Medical Association, San Francisco, Calif.). *Aviation, Space, and Environmental Medicine*, vol. 48, May 1977, p. 468-470.

Physician passengers on airlines are frequently called to assist the flight crew if an emergency medical situation arises. There have been numerous studies and reports pertaining to medical emergencies inflight, the various aspects of crew responsibility and reaction, and the types of emergency medical supplies available. This paper is to present the comments and opinions of physicians who have been called upon to assist the flight crew during inflight emergency medical situations. The background information is presented followed by statistics as to types of conditions encountered; physicians' responses; physicians' comments as to airline emergency medical supplies; flight crew, airline, and airport responses to medical emergencies and suggestions from physicians as to what significant changes may be indicated. (Author)

A77-34066 **Complexities of human factors in aviation.** M. S. Moore (Air Canada, Toronto, Canada). *Aviation, Space, and Environmental Medicine*, vol. 48, May 1977, p. 471-473.

Study of the causes of approach and landing accidents has revealed seven basic categories of human failure. These are: visual illusions; lack of altitude awareness; poor inflight judgement or decisions; nonadherence to standard operating procedures; failure to

be sure someone is flying the airplane during routine irregularities; failure to monitor critical flight instruments; and poor crew coordination. The aim of the present paper is to provide insight into situations where the complexity of the numerous factors involved may influence man's capacity to respond, his actual response, and the cost of that response to the passengers, the aircraft, and the crew. V.P.

A77-34067 # The rise in neuropsychiatric ailments in the armed forces (L'incremento delle malattie neuropsichiatriche nelle forze armate). L. Longo (Aeronautica Militare, Commissione Sanitaria d'Appello, Rome, Italy). (S.H.A.P.E., Medical Conference, Casteau, Belgium, Apr. 12-14, 1976.) *Rivista di Medicina Aeronautica e Spaziale*, vol. 39, July-Dec. 1976, p. 261-288. 37 refs. In Italian.

Sociological and philosophical conflicts are considered in addition to psychodynamic factors in relation to a general increase in occurrence of mental ailments in society in general and in military establishments in particular. Ambiguities in the definition of roles and obligations for the armed forces in society, attitudes toward war, 'defense,' militarism, and stress on the individual confronting giving or receiving orders to kill are touched upon. Imperfect adaptation of concepts of authority, hierarchy, obedience, and discipline to sociocultural reality, and the unfeasibility of rendering the armed forces per se a 'pilot' subsociety acting to cure the general society's ills in areas of alienation and anomie are discussed. Needs felt by the individual as member of a social unit are outlined. R.D.V.

A77-34068 # Protection from hyperbaric oxygen intoxication by some derivatives of alpha-ketoglutaric acid. A. Cerrati, C. F. Fornara, F. Viola (Milano, Università, Milan, Italy), and G. Ruggieri (Aeronautica Militare, Istituto Medico Legale Angelo Mosso, Milan, Italy). (European Association of Poison Control Centers, International Congress, 7th, Oslo, Norway, June 8-11, 1976.) *Rivista di Medicina Aeronautica e Spaziale*, vol. 39, July-Dec. 1976, p. 289-294. 11 refs.

A77-34069 # A case of spontaneous pneumothorax caused by rapid decompression at actual or simulated altitude (Pneumotorace spontaneo da decompressione rapida in condizioni di altitudine naturale o simulata). G. Rotondo (Aeronautica Militare, Servizio di Sanità, Rome, Italy). (INRCA, Congresso Internazionale su Recenti Acquisizioni in Biometeorologia ed Applicazioni Pratiche del Clima di Altitudine Naturale e Simulata, Ancona, Italy, Sept. 5-9, 1976.) *Rivista di Medicina Aeronautica e Spaziale*, vol. 39, July-Dec. 1976, p. 295-317. 44 refs. In Italian.

The article reports and analyzes a spontaneous pneumothorax case provoked by failure of the aircraft pressurization system with rapid cockpit depressurization. The etiopathogenesis is analyzed by examining conditions occurring in pressurized aircraft in high-altitude flight and analyzing simulated flight conditions in a depression chamber, in response to mechanical failure or damage to sealing components. Preventive measures, including rigorous personnel selection measures, are weighed; preconditioning in decompression tests and high-altitude flight is recommended. Criteria for prompt aeromedical evacuation are presented. R.D.V.

A77-34070 # Clinical-functional notes on the behavior of the cardiocirculatory apparatus of members of a high-altitude mountain-climbing expedition (Rilievi clinico-funzionali sul comportamento dell'apparato cardiocircolatorio nei membri di una spedizione alpinistica di alta quota). C. A. Ramacci (Scuola Militare di Sanità Aeronautica, Italy), G. Meineri (Aeronautica Militare, Centro di Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome, Italy), and M. Marini. (INRCA, Congresso Internazionale su Recenti Acquisizioni in Biometeorologia ed Applicazioni Pratiche del Clima di Altitudine Naturale e Simulata, Ancona, Italy, Sept. 5-9, 1976.)

Rivista di Medicina Aeronautica e Spaziale, vol. 39, July-Dec. 1976, p. 318-328. In Italian.

Reports of functional physiological tests, first at sea level, later at simulated altitude in a depression chamber, run on members of a mountain-climbing expedition to the Karakorum range are presented. Expedition members underwent step tests at altitudes from 2000 to 4500 m above sea level, under a variety of physiological conditions. Traces of humeral blood pressure, heart rate, and electrocardiograms were taken. Results show a higher demand for pulmonary circulation in hypoxia, attested by atrial changes. The changes are attenuated because of acclimatization and training. R.D.V.

A77-34071 # Psychopathology of air traffic controllers and radar operators (Psicopatologia dei controllori del traffico aereo e degli operatori-radar). L. Longo (Aeronautica Militare, Commissione Sanitaria d'Appello, Rome, Italy). (NATO, AGARD, Aerospace Medical Panel Meeting, 33rd, Athens, Greece, Sept. 20-24, 1976.) *Rivista di Medicina Aeronautica e Spaziale*, vol. 39, July-Dec. 1976, p. 329-341. 7 refs. In Italian.

Personnel selection, varieties of ATC installations at different airports, the nature of ATC work quarters, the heterogeneity of air traffic, the heavy ATC load, and the added ATC load anticipated from the introduction into service of VTOL craft and SST, are considered in their effects on ATC personnel psychopathology. Stress-inducing factors in pilot-ATC interactions, dysphoric and dysthymic psychopathological patterns, neurasthenic and psychosomatic responses are categorized, and a nosographic classification of psychopathological responses afflicting some ATC personnel is attempted. R.D.V.

A77-34072 # On the usefulness of the Bales group interview in the study of some behavioral types (Sull'utilità dell'intervista di gruppo secondo Bales nello studio di alcuni tipi di comportamento). F. Sparvieri (Aeronautica Militare, Istituto Medico Legale Aldo di Loreto, Rome, Italy). *Rivista di Medicina Aeronautica e Spaziale*, vol. 39, July-Dec. 1976, p. 342-347. In Italian.

Socioemotive and neutral modes of participation in group discussion in the Bales group interview (BGI) framework are outlined and possible interpretation of BGI data in relation to studies of individual behavior patterns are discussed. Correlations between BGI data and data on social introversion and the D48 test variable associated with Spearman G-factor are sought. R.D.V.

A77-34073 # On characterological selection - Doctrinal, deontological, and practical problems (Sulla selezione caratterologica - Problemi dottrinari, deontologici e pratici). F. Sparvieri (Aeronautica Militare, Istituto Medico Legale Aldo di Loreto, Rome, Italy). *Rivista di Medicina Aeronautica e Spaziale*, vol. 39, July-Dec. 1976, p. 352-356. In Italian.

Characterological selection (ChS) is examined as a criterial approach to selection of personnel and is definitively rejected. ChS is delineated from other personnel selection approaches (psychiatric selection, specific or nonspecific psychological selection, preliminary weeding out of unsuitable candidates). ChS is found inconsistent in point of doctrine, in its unverifiable value judgments and assumption of an unchanging personality structure. ChS is found inadmissible as an ethical guideline for personnel selecting bodies; the approach is judged useless in practice. R.D.V.

A77-34074 # Pneumothorax and aviation personnel (Pneumothorax et personnel navigant). G. Leguay (Hôpital D'Instruction des Armées Dominique Larrey, Versailles, France). (NATO, AGARD, Meeting, Scuola Militare di Sanità Aeronautica, Rome, Italy, Feb. 27, 1976.) *Rivista di Medicina Aeronautica e Spaziale*, vol. 39, July-Dec. 1976, p. 357-369. In French.

Some general aspects of spontaneous pneumothorax are discussed, along with concomitant problems. Acceleration appears to cause more problems than atmospheric decompression. The need for an etiopathological examination is emphasized. Slight subcortical

bladder lesions and the possibility of relapse (if the subject is not operated on) are discussed. Qualifying tests for the subject to resume flying status include a simulated ascent in a decompression chamber and a centrifugal acceleration. R.D.V.

A77-34118 The human element in sociotechnical systems (El elemento humano en los sistemas sociotécnicos). A. Yáñez Velasco. *Revista de Aeronáutica y Astronáutica*, vol. 37, Apr. 1977, p. 272-282. In Spanish.

A general outline of a systems approach to human-in-the-loop systems is presented. Manned spacecraft, mechanized process control and monitoring with limited human intervention and decision making, tracking systems, and aircraft are considered as typical systems of the type. Advantages of the human component of the system, human input/output channels, and nonlinearities in human response (threshold and saturation phenomena; psychosensorial and perceptual nonlinearities), stability of the system, compensation, mathematical models, and performance characteristics of the human/machine loop are discussed. R.D.V.

A77-34283 Release of adenosine, inosine and hypoxanthine from the isolated guinea pig heart during hypoxia, flow-autoregulation and reactive hyperemia. J. Schrader, F. J. Haddy, and E. Gerlach (München, Universität, Munich, West Germany). *Pflügers Archiv*, vol. 369, no. 1, 1977, p. 1-6. 20 refs.

A77-34284 Thermoregulatory behaviour after repetitive cooling of the preoptic area and of the spinal cord in the rat. M. Cormarèche-Leydier, M. Cabanac (Lyon I, Université, Oullins, Rhône, France), M. Banet, and H. Hensel (Marburg, Universität, Marburg an der Lahn, West Germany). *Pflügers Archiv*, vol. 369, no. 1, 1977, p. 17-20. 15 refs. Research supported by the Deutsche Forschungsgemeinschaft.

A77-34285 Thermoregulation during entrance into hibernation. H. C. Heller, G. W. Colliver, and J. Beard (Stanford University, Stanford, Calif.). *Pflügers Archiv*, vol. 369, no. 1, 1977, p. 55-59. 30 refs. Grant No. NIH-R01-NS-1067.

The hypothalamic temperature and the rate of oxygen consumption of golden-mantled ground squirrels were continuously measured as they entered hibernation. Hypothalamic temperature was manipulated with chronically implanted, water perfused thermodes. A threshold hypothalamic temperature for eliciting an increase in metabolic heat production was demonstrable at all times during entry. During smooth entries this threshold hypothalamic temperature showed a progressive decline so that it was below actual hypothalamic temperature at all times. These results are interpreted to mean that the normal mammalian central nervous regulator of body temperature is functional throughout the entrance into hibernation, and it can be reset to any level over the 35°C range of body temperatures experienced by the hibernator. (Author)

A77-34313 Circuit for automatically zeroing aortic flow base-line from electromagnetic flowmeter. D. G. Wantzelius (St. Luke's Hospital, Kansas City, Mo.) and K. L. Goetz (St. Luke's Foundation for Medical Education and Research, Kansas City, Mo.). *American Journal of Physiology*, vol. 232, May 1977, p. H534-H536. Grant No. PHS-HL-13623.

We describe an inexpensive circuit designed to correct base-line drift of electromagnetic flowmeters automatically when cardiac output is being measured. The circuit measures the flowmeter output voltage during a portion of each diastole when blood flow in the aorta is assumed to be zero. Any deviation of the flowmeter output voltage from zero during this time represents either base-line offset or drift. The output voltage obtained during zero flow conditions is stored throughout the next cardiac cycle and subtracted continuously from the flowmeter output during each beat, thus giving a beat-by-beat correction of any base-line drift. (Author)

A77-34314 Direct calibration of a totally implantable pulsed Doppler ultrasonic blood flowmeter. H. V. Allen, M. F. Anderson, and J. D. Meindl (Stanford University, Medical Center, Stanford, Calif.). *American Journal of Physiology*, vol. 232, May 1977, p. H537-H544. 16 refs. Grant No. PHS-1-P01-GM-17940.

A77-34399 Hydroxyproline-containing protein adsorbed on to cellular elements of whole human blood. R. Miller, M. B. Engel, and H. R. Catchpole (Illinois, University, Chicago, Ill.). *Nature*, vol. 267, May 19, 1977, p. 272-274. 22 refs. Research supported by the Pearl S. Stetler Foundation and PHS.

The letter reports the discovery of a collagen component that is normally associated with the cellular elements of human blood. This component, identified as a hydroxyproline-containing protein, was discovered by analyzing whole blood and its fractions for protein-bound hydroxyproline and was revealed by immunofluorescence in clotted blood smears containing a specific antiserum to human collages. It is noted that as a blood component, the discovered protein is distinct from and additional to Clq, the hydroxyproline-containing protein that is a part of the first component of complement. The protein is shown to resemble collagen in both antigenic and chemical qualities and to be a physiological component of the formed elements of blood. F.G.M.

A77-34451 * Novel prebiotic systems - Nucleotide oligomerization in surfactant entrapped water pools. D. W. Armstrong, F. Nome, J. H. Fendler, and J. Nagyvary (Texas A & M University, College Station, Tex.). *Journal of Molecular Evolution*, vol. 9, May 13, 1977, p. 213-223. 35 refs. NASA-supported research.

A77-34452 * Nearest-neighbor doublets in protein-coding regions of MS2 RNA. T. H. Jukes (California, University, Berkeley, Calif.). *Journal of Molecular Evolution*, vol. 9, May 13, 1977, p. 299-303. 9 refs. Grant No. NGR-05-003-460.

'Nearest neighbor' base pairs ('doublets') in the protein-coding regions of MS2 RNA have been tabulated with respect to their positions in the first two bases of amino acid codons, in the second two bases, or paired by contact between adjoining codons. Considerable variation is evident between numbers of doublets in each of these three possible positions, but the totals of each of the 16 doublets in the coding regions of the MS2 RNA molecule show much less variation. Compilations of doublets in nucleic acid strands have no predictive value for the amino acid composition of proteins coded by such strands. (Author)

A77-34453 Visual detection of aperiodic spatial stimuli by probability summation among narrowband channels. N. Graham (Columbia University, New York, N.Y.). *Vision Research*, vol. 17, no. 5, 1977, p. 637-652. 27 refs. NSF Grant No. BMS-75-07658.

Recent psychophysical results of Shapley and Tolhurst and of Kulikowski and King-Smith have suggested that the visual system contains broadband channels like 'edge detectors' and 'line detectors' as well as relatively narrowband 'spatial frequency' channels. These recent results (including thresholds for aperiodic stimuli) can be completely explained using only relatively narrowband channels with probability summation among them. This explanation requires many fewer free parameters than the original explanation based on both broadband and narrowband channels. The bandwidths of the individual narrowband channels can be estimated and are similar to those previously estimated from sine-wave summation experiments. (Author)

A77-34454 The curvature of oblique saccades. P. Viviani, A. Berthoz, and D. Tracey (CNRS, Laboratoire de Physiologie du Travail, Paris, France). *Vision Research*, vol. 17, no. 5, 1977, p. 661-664. 12 refs. Centre National de la Recherche Scientifique Contract No. ATP-1912.

Oblique saccades do not follow a straight path but rather exhibit a curvature which was studied in humans using the scleral coil technique. Voluntary and optokinetic oblique saccades were analysed. They showed a systematic dominance of the horizontal component over the vertical one which is independent of the initial gaze position and amplitude. (Author)

A77-34631 # Nerve-specific proteins and their possible physiological functions (Nervospetsificheskie belki i ikh vozmozhnye fiziologicheskie funktsii). V. P. Kaznacheev, M. B. Shtark, L. V. Gorsh, and Kh. L. Gainutdinov (Akademiia Meditsinskikh Nauk SSSR; Akademiia Nauk SSSR, Institut Avtomatiki i Elektrometrii, Novosibirsk, USSR). *Uspekhi Fiziologicheskikh Nauk*, vol. 8, Apr.-June 1977, p. 28-52. 184 refs. In Russian.

Biochemical and immunological techniques for identifying nonspecies-specific neuroproteins, including S-100, 14-3-2, and the VE antigen, are reviewed, and synaptic proteins specific to mollusks are described. Data pertaining to the role of neuroproteins in synaptic activity, membrane spike generation and conduction, and the mechanism coordinating brain activity are discussed. A previously suggested hypothesis on the participation of neuroproteins in the mechanisms of learning and memory is developed. M.L.

A77-34632 # Blood flow and ventilation in the optimization of lung gas exchange (Krovotok i ventilatsiia v optimizatsii legochnogo gazoobmena). D. P. Dvoretzskii (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Uspekhi Fiziologicheskikh Nauk*, vol. 8, Apr.-June 1977, p. 112-131. 170 refs. In Russian.

The significance of lung tissue and thin peripheral bronchi for understanding variations in the functional interrelationship between lung blood flow and ventilation in different regions of the lungs is reviewed. The regulatory mechanisms responsible for optimizing local and regional ventilation-perfusion ratios are discussed. The importance of a reduction in alveolar partial oxygen pressure for the autoregulation of gas exchange is stressed, as is the possibility of obtaining highly useful information from a study of the temporary correlations in the ongoing processes of local blood flow and ventilation. M.L.

A77-34643 Significance and treatment of nocturnal angina preceding myocardial infarction. E. Lichstein, K. D. Chadda, P. K. Gupta (Maimonides Medical Center, Brooklyn, N.Y.), and C. Alosilla (City Hospital Center, Elmhurst, N.Y.). *American Heart Journal*, vol. 93, June 1977, p. 723-726. 14 refs.

A77-35310 AutoMicrobic System - One step farther. R. C. Mattaline (McDonnell Douglas Astronautics Co., St. Louis, Mo.). In: Space Congress, 14th, Cocoa Beach, Fla., April 27-29, 1977, Proceedings. Cocoa Beach, Fla., Canaveral Council of Technical Societies, 1977, p. 2-21 to 2-23, 2-23A to 2-23H.

The AutoMicrobic System (AMS) is an automated analytical instrument for monitoring the bacterial health of man on long space missions. The basic concept embodies selective media, a disposable sealed specimen handling system, a solid state optical reader, and a computer processor. B.J.

A77-35401 Pathophysiologic assessment of hypertensive heart disease with echocardiography. F. G. Dunn, P. Chandraratna, L. L. Basta (Oklahoma, University, Oklahoma City, Okla.), E. D. Frohlich (Ochsner Medical Institutions, New Orleans, La.), and J. G. R. deCarvalho. *American Journal of Cardiology*, vol. 39, May 26, 1977, p. 789-795.

The ability of echocardiography, a noninvasive technique, to assess pathophysiologic changes associated with systemic hypertension was tested. Age-matched normotensive subjects and patients

with hypertension but without clinical evidence of coronary artery disease were studied (before patients received antihypertensive therapy). Patients were divided into three groups on the basis of electrocardiographic and X-ray criteria. Mean arterial pressure differed significantly in the three groups, and this increase was associated with a similar significant increase in left ventricular mass assessed with echocardiogram. Increases were also found in both posterior wall and septal thickness. It is concluded that increased ventricular mass can be identified with echocardiography at an early stage of hypertensive heart disease when only left atrial abnormality is identifiable with electrocardiographic criteria, and decreased left ventricular performance occurs with increasing arterial pressure and left ventricular hypertrophy. M.L.

A77-35402 Pathology of the heart in sudden cardiac death. D. D. Reichenbach, N. S. Moss, and E. Meyer (Washington, University, Seattle, Wash.). *American Journal of Cardiology*, vol. 39, May 26, 1977, p. 865-872. 21 refs. Grants No. PHS-NO1-HV-12474; No. PHS-HL-18805.

A77-35403 Derangements of myocardial metabolism preceding onset of ventricular fibrillation after coronary occlusion. E. Corday, M. K. Heng, S. Meerbaum, T.-W. Lang, J.-C. Farcot, J. Osher, and K. Hashimoto (Cedars-Sinai Medical Center; California, University, Los Angeles, Calif.). *American Journal of Cardiology*, vol. 39, May 26, 1977, p. 880-889. 35 refs. Research supported by the Jules Stein Foundation, Emanuel Borinstein Memorial Fund, Beneficial Standard Life Insurance Co.; Grants No. NIH-HL-17651-02; No. NIH-HL-15834-03.

Differences between dogs that did and did not manifest ventricular fibrillation within 30 minutes after experimentally-induced coronary arterial occlusion were studied. Animals with subsequent fibrillation had significantly higher heart rates before and after coronary occlusion. These animals showed greater metabolic changes in the occluded segment than dogs with no subsequent fibrillation as indicated by transmyocardial lactate extraction, potassium balance, sodium/potassium ratio, and blood pH. Sudden massive lactate production, potassium loss, and increased acidosis of the occluded portion were detected within 5 minutes of the onset of fibrillation. Animals with ventricular fibrillation had higher intracoronary S-T segment elevation that persisted until the onset of ventricular fibrillation. M.L.

A77-35404 Neural and psychologic mechanisms and the problem of sudden cardiac death. B. Lown, R. L. Verrier, and S. H. Rabinowitz (Harvard University; Peter Bent Brigham Hospital, Boston, Mass.). *American Journal of Cardiology*, vol. 39, May 26, 1977, p. 890-902. 113 refs. Grants No. PHS-MN-21384; No. NIH-HL-07776; No. NIH-HL-18783.

Various factors that can lead to sudden cardiac death are considered. Brain stimulation can provoke a variety of arrhythmias and lower the ventricular vulnerable threshold which, in animals with acute myocardial ischemia, suffices to provoke ventricular fibrillation. Increased sympathetic activity, whether induced by neural or neurohumoral action, predisposes the heart to ventricular fibrillation. With acute myocardial ischemia, augmented sympathetic activity accounts for the early surge of ectopic activity frequently precipitating ventricular fibrillation. Although vagal neural traffic and adrenal catecholamines are not the conduits for brain-heart linkage, they do exert an indirect effect on cardiac vulnerability, and their effects are discussed. M.L.

A77-35411 Oxygen transport during early altitude acclimatization - A perspective study. J. P. Hannon (U.S. Army, Letterman Army Institute of Research, Presidio of San Francisco, Calif.) and J. A. Vogel (U.S. Army, Army Research Institute of Environmental Medicine, Natick, Mass.). *European Journal of Applied Physiology*, vol. 36, no. 4, 1977, p. 285-297. 25 refs.

Parameters relating to oxygen transport were measured in subjects initially at low altitude (200 m) and subsequently during a

15 day sojourn at high altitude (4300 m). Cardiac output, heart rate, mean arterial pressure, and left ventricular work were transiently increased with maximum values observed on the second day at high altitude. The variation patterns of physiological features such as arterial oxygen content, pulmonary hemoglobin, and stroke volume are described. It is suggested that altitude acclimatization progresses through three distinct but overlapping stages. M.L.

A77-35450 Studies of the electrocardiogram using realistic cardiac and torso models. B. N. Cuffin (MIT, Cambridge, Mass.) and D. B. Geselowitz (Pennsylvania State University, University Park, Pa.). *IEEE Transactions on Biomedical Engineering*, vol. BME-24, May 1977, p. 242-252. 26 refs. NSF Grant No. GK-36608.

The use of digital computer models in investigating the forward and inverse problems of electrocardiography; a simplified approach to elaborating an accurate 20-dipole cardiac model from experimentally measured excitation data is described and tested. The solution of the inverse problem is investigated for the electric multipole expansion (EME) cardiac model in the homogeneous torso. The least squares error inverse solutions for terms in the EME model are compared with corresponding terms in the EME model of the actual 20-dipole model which produced the surface potential data. The effect of varying number and location of potential data sites on the torso is studied in detail, and the influence of lung tissue on these solutions is taken into account. R.D.V.

A77-35533 # Role of studying the heart-beat frequency when evaluating the functional state of human operators (Rol' issledovaniia chastoty serdechnykh sokrashchenii v otsenke funktsional'nogo sostoiianiia cheloveka-operatora). V. M. Akhutin, A. M. Zingerman, M. M. Kislitsin, and D. N. Menitskii (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologiya Cheloveka*, vol. 3, Mar.-Apr. 1977, p. 295-301. 14 refs. In Russian.

As part of a study of the use of physiological measurements to predict peoples' behavior, subjects were divided into two groups on the basis of their sympathetic and parasympathetic nervous system responses to tracking tasks. These two groups also differed with regard to physiological parameters during psychosensory rest, work rest, information processing, and hypoxia. On the basis of EKG readings, two groups of workers were distinguished. One group is said to react in a manner suitable for repetitious work, and the other group is said to be more able to adapt to nonrepetitive work. M.L.

A77-35534 # Effect of emotional stress on some self-regulatory processes of higher nervous activity (Vlianie emotsional'nogo napriazheniia na nekotorye protsessy samoregulatsii vysshei nervnoi deiatel'nosti). V. E. Nagornyi, A. M. Goncharenko, E. M. Molodtsova, and V. M. Shakhnarovich (Moskovskii Gosudarstvennyi Universitet, Moscow; Ministerstvo Putei Soobshcheniia, Vsesoiuznyi Nauchno-Issledovatel'skii Institut Zheleznodorozhnoi Gigeny, USSR). *Fiziologiya Cheloveka*, vol. 3, Mar.-Apr. 1977, p. 302-307. 19 refs. In Russian.

Polygraph recordings of sleep are studied in relation to polygraph recordings of bioelectric activity of the articulation musculature during a stress-free period and during natural psycho-emotional stress (caused by a school examination). When the faces of sleeping subjects revealed signs of stress, marked changes occurred in the electrophysiological pattern. The role of sleep in stabilizing the personality and the significance of the parasympathetic responses are considered. M.L.

A77-35535 # Interaction of the analyzers during orientation about a gravitational vertical (Vzaimodeistvie analizatorov pri orientirovke otноситel'no gravitatsionnoi vertikali). B. B. Bokhov and S. L. Kantor. *Fiziologiya Cheloveka*, vol. 3, Mar.-Apr. 1977, p. 308-316. 24 refs. In Russian.

The ability of subjects to indicate the correct vertical direction when confronted with a picture showing an apparent vertical was studied for cases permitting limited visual field or vestibular-

proprioceptive stimuli. The studies involved different positionings of the picture with regard to the subject and sometimes rotation of the subject. The ability of a subject to point his hand toward the vertical was also investigated in similar experimental circumstances. M.L.

A77-35536 # Proprioceptive influence on auditory function (Propriotseptivnye vlianiia na slukhovuiu funktsiiu). N. Iu. Alekseenko and V. M. Kamenkovich (Akademiia Nauk SSSR, Institut Vysshiei Nervnoi Deiatel'nosti i Neirofizologii, Moscow, USSR). *Fiziologiya Cheloveka*, vol. 3, Mar.-Apr. 1977, p. 324-328. 20 refs. In Russian.

The effect of a subject's turning his head on his auditory threshold and his ability to locate a sound were studied. Although both the monaural (threshold) and binaural (location) responses were influenced by the same neck proprioceptive stimuli, the changes in the two responses did not correlate. The source of the inhibition affecting the binaural case is considered. M.L.

A77-35537 # Physiological substantiation of the permissible magnitudes of external resistance to breathing (Fiziologicheskoe obosnovanie dopustimyykh velichin vneshnego soprotivleniia dykhaniiu). L. G. Golovkin, V. N. Poliakov, M. A. Tikhonov, V. K. Stepanov, H. M. Asiamolova, and I. G. Dlusskaia. *Fiziologiya Cheloveka*, vol. 3, Mar.-Apr. 1977, p. 329-335. 8 refs. In Russian.

The paper is concerned with the search for the most suitable physiological criteria for evaluating the functional state and work capacity of people during respiration with external resistance, and also the determination of permissible limits of resistance corresponding to different conditions of physical activity. Data are presented for several experiments in which a valve apparatus was used to control external resistance in breathing. M.L.

A77-35538 # Role of carbon dioxide in humans undergoing step-wise hypoxia and the character of the change of lung ventilation (Rol' uglekisloty pri vozdeistvii na organizm cheloveka stupenchatoi gipoksii i kharakter izmeneniia legochnoi ventilatsii). N. A. Agadzhanian, G. A. Davydov, and Iu. A. Spasskii (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Fiziologiya Cheloveka*, vol. 3, Mar.-Apr. 1977, p. 343-354. 30 refs. In Russian.

The effects of a 'hypoxic' atmosphere and a 'hypoxic-hypercapnic' atmosphere on breathing parameters were studied in a series of experiments in which the oxygen and carbon dioxide concentrations were varied. Cases for which the parameters remain comparatively normal despite abnormal mixtures of inhaled gases are considered, and ventilation modifications induced by different gas mixtures are examined. M.L.

A77-35539 # Seasonal and daily rhythms of the color-perceiving function of the visual analyzer in healthy people (Sezonnye i sutochnye ritmy tsветоoshchushchaisushchei funktsii zritel'nogo analizatora zdorovogo cheloveka). O. K. Veklich and V. A. Matiukhin (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR). *Fiziologiya Cheloveka*, vol. 3, Mar.-Apr. 1977, p. 362-367. 21 refs. In Russian.

A77-35544 # Reserve capacity of the cardiovascular system among hyperreactive people under conditions of hypoxia (Rezervnye vozmozhnosti serdechno-sosudistoi sistemy u giperreaktivnykh lits v usloviakh gipoksii). V. G. Mashkovskii. *Voenno-Meditsinskii Zhurnal*, Mar. 1977, p. 44-47. In Russian.

Cardiological stress tests were used to study cardiodynamic features and the reserve capacity of the cardiovascular system of hyperreactive people who had unstable arterial pressure and labile pulse not caused by any discernable physical trait, after these people had been transferred to mountain regions 3800 to 4200 m above sea level. The effects of hypoxia on these individuals are analyzed. M.L.

A77-35545 # Functional state and work capacity in man breathing oxygen without excess pressure at great heights (Funktsional'noe sostoianie i rabotosposobnost' cheloveka pri dykhanii kislorodom bez izbytochnogo davleniia na bol'shikh vysotakh). I. N. Cherniakov, P. Ia. Azhevskii, V. I. Zorile, and I. V. Maksimov. *Voenna-Meditsinskii Zhurnal*, Mar. 1977, p. 47-50. In Russian.

A77-35546 # Dynamics of carbohydrate metabolism in pilots learning new aviatonal techniques (Dinamika uglevodnogo obmena u letchikov v period osvoiniia imi novoi aviatsonnoi tekhniki). A. S. Lysenko, B. A. Bariatsinskii, and N. Ia. Dasov. *Voenna-Meditsinskii Zhurnal*, Mar. 1977, p. 51-53. In Russian.

Blood sugar levels of pilots were determined 15 minutes after each of three training flights per day, and were also determined on days when the pilots were not flying. Diurnal patterns and differences between more and less experienced pilots are discussed. Other physiological features were measured in a specially-equipped flight trainer. It is suggested that blood sugar levels, in consideration along with other psychophysiological criteria, might indicate the extent to which pilots have mastered new techniques. M.L.

A77-35547 # Character of catecholamine excretion by pilots after completing simulator training flights (Kharakter ekskretsii katekholaminov u pilotov, vypolniaiushchikh trenazhernye polety). N. I. Khankin and Kh. M. Stoliar. *Voenna-Meditsinskii Zhurnal*, Mar. 1977, p. 53, 54. In Russian.

A77-35548 # Significance of vascular thermoreception in the mechanism of regulating cold-induced shivering (Znachenie sosudistoi termoretseptsii v mekhanizme regulirovaniia kholodovoi drozhi). G. I. Kuz'mina and Iu. V. Lupandin (Petrozavodskii Gosudarstvennyi Universitet, Petrozavodsk, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 63, Apr. 1977, p. 573-576. 7 refs. In Russian.

Chilling the subcutaneous medial vein in the shin area in anesthetized cats induced shivering in flexors similar to shivering induced by whole-body cooling. Heating prevented shivering, but the functioning of the extensor motor neurons was not affected by the temperature regime. It is suggested that afferent conduction from vessel thermoreceptors during a reduction in ambient temperature is required for the adoption of the flexed posture, and is responsible for shivering being restricted to the flexors in the extremities. M.L.

A77-35549 # Tissue and cell resistance in rats adapted to hypoxia, deep hypothermia, and hypercapnia (Rezistentnost' tkanei i kletok u krys, adaptirovannykh k gipoksii, glubokoi gipotermii i giperkapnii). G. N. Akoeva, N. V. Korostovtseva, E. D. Chernikova, and L. G. Zalkind (Pediatricheskii Meditsinskii Institut, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 63, Apr. 1977, p. 577-581. 16 refs. In Russian.

Within 2 to 4 days after exposure to the combined action of increasing hypoxia, hypercapnia, and cooling, rats developed an increased resistance to hypoxia and deep hypothermia. Simultaneously, osmotic stability of erythrocytes increased, while absorption of dye by the brain and muscle tissues decreased. (Author)

A77-35550 # Cardiac response to functional stress of rats adapted to physical stress (Reaktsiia serdtsa na funktsional'noi nagruzku adaptirovannykh k fizicheskim nagruzkam krys). V. I. Kapel'ko and L. M. Giber (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 63, Apr. 1977, p. 597-599. 14 refs. In Russian.

A77-35591 # Blood complement in response to experimental ultrasonic irradiation (Komplement krovi pri deistvii ul'trazvukovykh kolebaniy v eksperimente). A. I. Khirseli and O. V. Mgaloblishvili. (Ministerstvo Zdravookhraneniia Gruzinskoi SSR, Institut Eksperimental'noi i Klinicheskoi Khirurgii, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 84, Dec. 1976, p. 737-740. 6 refs. In Russian.

Complementary activity of the serum (titration against 100% hemolysis) in response to treatment with ultrasonic waves of different intensity and over different exposure times in 56 white rat subjects (strainless) is discussed. The investigations show that ultrasound brings about a change in immunological reactivity, manifested in a drop in the content of the complement and even complete disappearance of complement from the serum. The complement content in the serum is shown to be a sensitive function of the intensity and duration of the ultrasonic exposure. R.D.V.

A77-35595 # Patterns of reflection of motionless spatial objects on the retina in binocular vision (O kharaktere otobrazheniia na setchatkakh nepodviznykh prostranstvennykh ob'ektov pri binokuliarnom zrenii). O. S. Tavdshvili (Akademiia Nauk Gruzinskoi SSR, Institut Kibernetiki, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 85, Jan. 1977, p. 61-63. In Russian.

Views on bifixation of three-dimensional nonmoving objects on the retina in binocular vision are reviewed briefly. Bifixation is characterized by a specified angle between the lines of vision, and the angle of convergence to the bifixed point. A useful division of the field of vision in bifixation is presented. A geometric scheme is elaborated for the mapping of the object onto the retina. R.D.V.

A77-35599 # 'Reciprocal' relations between spindles of sensory and associative areas of the cerebral cortex (O 'retsiproknykh' otnosheniakh vereten sensornoi i assotsiativnoi oblasti kory bol'shikh polusharii golovnogo mozga). S. P. Narikashvili and D. V. Kadzhaia (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 85, Jan. 1977, p. 157-160. 5 refs. In Russian.

A77-35600 # Cholinesterase histochemistry and the structural organization of the heart conduction system (Gistokhimiia kholinesterazy i voprosy strukturnoi organizatsii provodiashchei sistemy serdtsa). N. D. Bakradze and L. A. Murvanidze (Ministry of Health of USSR, Tiflis State Institute for Advanced Training for Physicians, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 85, Jan. 1977, p. 173-176. In Georgian, with abstract in English.

A comparatively organized cell system comprising specific fibers and nerve formations is found representative of the heart conduction system and its fibers. Cholinesterase activity is studied histochemically, and the distribution pattern and density of cholinergic nerve structures in various regions of the heart conduction system (sinoatrial and atrioventricular nodes, the bundle of His and its crura) is investigated. The study extends to Purkinje cells in some mammals (cow, sheep, pig, dog, rabbit) and in humans (5 forensic medicine cases). R.D.V.

A77-35662 * Systems for animal exposure in full-scale fire tests. C. J. Hilado, H. J. Cumming (San Francisco, University, San Francisco, Calif.), D. A. Kourtides, and J. A. Parker (NASA, Ames Research Center, Moffett Field, Calif.). *Journal of Combustion Toxicology*, vol. 4, May 1977, p. 101-113. 8 refs. Grant No. NsG-2039.

Two systems for exposing animals in full-scale fire tests are described. Both systems involve the simultaneous exposure of two animal species, mice and rats, in modular units; determination of mortality, morbidity, and behavioral response; and analysis of the blood for carboxyhemoglobin. The systems described represent two of many possible options for obtaining bioassay data from full-scale fire tests. In situations where the temperatures to which the test animals are exposed can not be controlled, analytical techniques may be more appropriate than bioassay techniques. (Author)

A77-35663 A method for comparative testing of smoke toxicity. W. J. Potts and T. S. Lederer (Dow Chemical Co., Midland, Mich.). *Journal of Combustion Toxicology*, vol. 4, May 1977, p. 114-162. 23 refs.

The methods described in this communication are based on the recognition that pyrolysis and combustion must be treated as separate phenomena in order to obtain reproducible laboratory results. The problem of avoiding fractionation of pyrolysis or combustion vapors while not overheating the chamber in which the animals are housed has been solved by development of a heating furnace designed specifically for this purpose. Rat mortality is used as the toxicity index, for this appears to be the most objective and reproducible method. This report gives the results of detailed studies, including dose-response data, of six cellulosic materials, three polystyrene formulations, and one low density rigid urethane foam. Adaptations of the methods described herein are suggested for use as a simple screening test, suitable for the discovery of an unusual toxicity that might result from pyrolysis or combustion of a material of construction. (Author)

A77-35665 * A comparison of relative toxicity rankings by some small-scale laboratory tests. C. J. Hilado and H. J. Cumming (San Francisco, University, San Francisco, Calif.). *Journal of Combustion Toxicology*, vol. 4, May 1977, p. 173-180. 15 refs. Grant No. NSG-2039.

Small-scale laboratory tests for fire toxicity, suitable for use in the average laboratory hood, are needed for screening and ranking materials on the basis of relative toxicity. The performance of wool, cotton, and aromatic polyamide under several test procedures is presented. (Author)

A77-35668 * Studies with the USF/NASA toxicity screening test method - Exercise wheels and oxygen replenishment. C. J. Hilado and H. J. Cumming (San Francisco, University, San Francisco, Calif.). *Journal of Combustion Toxicology*, vol. 4, May 1977, p. 200-205. Grant No. NSG-2039.

Continuing efforts to improve the University of San Francisco/NASA toxicity screening test method have included the addition of exercise wheels to provide a different measure of incapacitation, and oxygen replenishment to offset any effect of oxygen depletion by the test animals. The addition of exercise wheels limited the number of animals in each test and doubled the required number of tests without any significant improvement in reproducibility. Oxygen replenishment appears to have an effect on survival in the last 5 minutes of the 30-minute test, but the effect is expected to be similar for most materials. (Author)

A77-35669 * The possibility of flash fires in toxicity tests. C. J. Hilado and H. J. Cumming (San Francisco, University, San Francisco, Calif.). *Journal of Combustion Toxicology*, vol. 4, May 1977, p. 206-215. 9 refs. Grant No. NSG-2039.

The concentrations of combustible compounds in the gases generated in toxicity tests may together result in a flammable mixture which could be ignited by accident or by a deficiency in procedure. The principal hazard stems from the increase in the concentrations of combustible non-toxic gases which may result from efforts to increase the concentrations of toxic gases to obtain desired physiological responses. (Author)

A77-35670 * Effect of carbon monoxide on Swiss albino mice. C. J. Hilado and H. J. Cumming (San Francisco, University, San Francisco, Calif.). *Journal of Combustion Toxicology*, vol. 4, May 1977, p. 216-230. 12 refs. Grant No. NSG-2039.

Times to incapacitation and death and LC50 values were determined for male Swiss albino mice exposed to different concentrations of carbon monoxide in a 4.2 liter hemispherical chamber. These values are compared to values reported in the literature. The LC50 for a 30 minute exposure was 3570 ppm CO. (Author)

A77-35672 * Effect of sulfur dioxide on Swiss albino mice. C. J. Hilado and A. M. Machado (San Francisco, University, San Francisco, Calif.). *Journal of Combustion Toxicology*, vol. 4, May 1977, p. 236-245. 5 refs. Grant No. NSG-2039.

Times to incapacitation and death and LC50 values were determined for male Swiss albino mice exposed to different concentrations of sulfur dioxide in a 4.2 liter hemispherical chamber. The LC50 for a 30 minute exposure was about 3000 ppm SO₂. (Author)

A77-35673 * Effect of nitrogen dioxide on Swiss albino mice. C. J. Hilado and A. M. Machado (San Francisco, University, San Francisco, Calif.). *Journal of Combustion Toxicology*, vol. 4, May 1977, p. 246-253. 6 refs. Grant No. NSG-2039.

Times to incapacitation and death and LC50 values were determined for male Swiss albino mice exposed to different concentrations of nitrogen dioxide in a 4.2 liter hemispherical chamber. The LC50 for a 10 minute exposure was about 1000 ppm NO₂. (Author)

A77-35674 A bibliography of published information on combustion toxicology. C. J. Hilado and H. J. Cumming (San Francisco, University, San Francisco, Calif.). *Journal of Combustion Toxicology*, vol. 4, May 1977, p. 254-262. 117 refs.

A77-35735 # The nature of hemodynamic shifts in orienting-search reactions induced by hypothalamic stimulation (Kharakter gemodinamichnikh zrushen' pri orientoval'no-poshukovii reaktsii, viklikanii podraznenniam gipotalamusa). A. G. Kartseva, A. M. Litvinova, O. P. Lukhanina, N. Z. Vasil'eva, L. G. Pil'tiai, and A. G. Shamsutdinova (Akademiia Nauk Ukrain'skoi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 23, Mar.-Apr. 1977, p. 154-161. 25 refs. In Ukrainian.

Behavioral responses and hemodynamic reaction induced by posterior-lateral hypothalamus stimulation are compared in relation to associated hemodynamic shifts. Stimulation of some regions of the posterior-lateral hypothalamus is shown to generate orienting-search reactions conditioned by other behavioral reactions (feeding, defensive, directed-searching, aggressive). Complex hemodynamic reactions (heart rate acceleration, increase in circulation volume of hind limb and aorta vessels, rise in arterial pressure) of hypothalamic origin are viewed as an adaptive reaction of the cardiovascular system, readying the animal for imminent muscular activity. R.D.V.

A77-35736 # Effect of stimulation of different regions of the hypothalamus on the rhythm of cardiac activity (Pro vpliv podraznennia riznykh viddiliv gipotalamusa na ritm seritsevoi dial'nosti). A. D. Begeka (Kiiv'skii Derzhavnyi Universitet, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 23, Mar.-Apr. 1977, p. 162-168. 42 refs. In Ukrainian.

Four modes of cardiac rhythmic reactions resulted from stimulation of the gray tuber, papillary, and ventromedial nuclei of the hypothalamus. The tuber and papillary nuclei were tested to destruction in some experiments. The magnitude and direction of cardiac rhythm changes depend on the parameters of the stimulating current. Slowing followed by acceleration, acceleration followed by slowing, and no changes during stimulation but slowing upon cessation of stimulation were observed when threshold current was applied. Application of above-threshold current brought about tachyarrhythmia and changes of direction pursuant to stimulation. Destruction of the gray tuber and papillary nuclei entailed bradyarrhythmia and elongation of P-W, Q-T, and T-p. R.D.V.

A77-35737 # Effect of elimination of carotid sinus receptors on changes in efferent sympathetic activity under acute hypoxic hypoxia (Vpliv vikiuchennia retseptoriv karokidnikh sinusiv na zmini eferentnoi simpatichnoi aktivnosti pri gostrii gipoksichnii gipoksii). S. A. Bershtein and O. V. Baziliuk (Akademiia Nauk Ukrain'skoi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 23, Mar.-Apr. 1977, p. 169-175. 19 refs. In Ukrainian.

Changes in efferent activity for acute hypoxia in animals with intact and eliminated carotid sinus receptors are shown. Comparison of changes in efferent sympathetic activity and hemodynamics under acute hypoxic hypoxia in animals with the intact or eliminated carotid sinus receptors indicates that elimination of afferent effects from the carotid sinuses weakens the compensatory capacities of the organism appreciably. The role of reflexogenic zones of carotid sinuses in the development of compensatory responses to acute hypoxic hypoxia is confirmed. (Author)

A77-35738 # The importance of topical rheoencephalography in the study of the physiology and pathology of blood circulation through various parts of the brain (Znachennia topichnoi reoentsefalografii u vivchenni fiziologii i patologii krovoobigu riznikh dilianok golovnogo mozku). A. A. Novikov, F. F. Getman, and E. P. Poluden (Odes'kii Medichnii Institut, Odessa, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 23, Mar.-Apr. 1977, p. 191-196. 10 refs. In Ukrainian.

A77-35739 # Dynamics of intracerebral blood flow in the course of work activities in workers at computer centers (Dynamika vnutrimozkovogo krovoobigu v protsesi trudovoi diial'nosti u pratsivnikiv obchisljuval'nikh tsestriv). O. A. Kononenko, V. V. Derkach, and V. V. Mikheev (Kharkivs'kii Institut Higieny Pratsi i Profesiinikh Zakhvoriuvan, Kharkov, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 23, Mar.-Apr. 1977, p. 249-252. 11 refs. In Ukrainian.

Recent results on high-stress intellectual labor obtained via rheoencephalography are reviewed. Dynamic rheoencephalographic records of intracerebral blood circulation in the case of programmer-mathematicians, electronic engineers, and computer operators and control panel operators over entire work-shifts were studied. The highest effects of stress on intracerebral circulation are registered in the case of computer operators. Overloading of central regulatory mechanisms responsible for maintenance of vascular tonus, with the attendant hazard of premature exhaustion of those mechanisms, is noted. R.D.V.

A77-35740 # Regulation of hemodynamics in the presence of oxygen deficiency in blood and tissues (Pro regulatsiiu gemodinamiki za defitsitom kisniu v krovi i tkaninakh). M. I. Gurevich and S. A. Bershtein (Akademiia Nauk Ukrain's'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 23, Mar.-Apr. 1977, p. 259-265. 41 refs. In Ukrainian.

The blood serum curve taken for the circulatory basin of a dog hind limb in the presence of reduced oxygen tension in the arterial blood stream was studied. Sudden abrupt changes in oxygen saturation of the arterial blood from 97% to 30% of its oxygen capacity were immediately accompanied by intensified blood flow, which rose from 80 to 120 ml/min in the first 30 sec, and to 160 ml/min within 60 sec, eventually attaining double the initial flowrate. The dynamics of normalization of the blood flow following resaturation of the arterial stream with oxygen to 97% presented a mirror image of this process. Records of the electrical and contractile activity of smooth-muscle cells of rat portal vein, rat aorta, and rat precapillary sphincter after administration of some agents (acetylcholine, adrenalin, gas mixture) are shown. R.D.V.

A77-35741 # Kinetic chemoluminescence characteristics of animal and human blood serum (Kinetichni khemiliuminestentni kharakteristiki sirovatki krovi tvarin i liudini). Ia. I. Serkis, E. Iu. Chebotar'ov, Z. P. Fedorova, E. Z. Riabova, and E. I. Gitis (Akademiia Nauk Ukrain's'koi RSR, Institut Problem Onkologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 23, Mar.-Apr. 1977, p. 274-276. 5 refs. In Ukrainian.

A77-35742 Evolutionary biology. Volume 9. Edited by M. K. Hecht (Queens College, Flushing, N.Y.), W. C. Steere (New York Botanical Garden, Bronx, N.Y.), and B. Wallace (Cornell University, Ithaca, N.Y.). New York, Plenum Press, 1976. 474 p. \$29.50.

Chromosome, DNA, and plant evolution are considered, taking into account the variation in nuclear DNA content and its significance, increases in DNA content, the linear differentiation of metaphase chromosomes, the fine structure of chromatin at the molecular level, and some unanswered questions. A phylogenetic classification of the Angiospermae is provided and the evolutionary development of wheat-rye combinations is described. Attention is given to the evolution of the rust fungi as reflected by their ecological problems, the evolution of parthenogenetic insects, seasonal polyphenism, phylogenetic inference and methodology as applied to the vertebrate record, and the analysis and modeling of evolutionary dynamics with the response structure environmental structure approach. G.R.

A77-35768 # Energetics of nerve cells and their oxygen supply (Energetika nervnykh kletok i snabzhenie ikh kislorodom). K. P. Ivanov. *Akademiia Nauk SSSR, Vestnik*, no. 3, 1977, p. 75-82; Discussion, p. 83, 84. In Russian.

Mathematical analysis based on available experimental data was used to determine the energetic requirements of individual nerve cells, the rate of blood flow in the capillaries of the cortex, and to define the fundamental laws governing the diffusion of oxygen from capillaries to neurons. The oxygen requirement per gram of brain tissue in unanesthetized white mice was measured at 69 plus or minus 2 microliters per minute. The calculated requirement per gram of neuron is 360 microliters O₂/min, or 1.76 cal/minute. A method was devised to film the motion of individual erythrocytes in the capillaries of unanesthetized mice; these were found to move at a mean linear velocity of 0.76 mm/sec. A mathematical model describing the diffusion of oxygen in a capillary aveolus with a volume of .000432 cu mm was constructed and solved by a finite difference method. Results confirm the suggestion that diffusion is a sufficiently efficient mechanism for oxygen transport in tissues. Living tissue shows some resistance to the diffusion of oxygen; certain areas of the microspace between capillaries are low in oxygen. C.K.D.

A77-35776 # The current status of space biorhythmology (Sovremennoe sostoianie kosmicheskoi bioritmologii). B. S. Aliakrinskii. *Kosmicheskaiia Biologiia i Aviakosmicheskaiia Meditsina*, vol. 11, Mar.-Apr. 1977, p. 3-12. 71 refs. In Russian.

A review is presented of work in general biorhythmology which paved the way for the study of biorhythms in space. Landmark observations in biorhythmology during the course of Soviet and American manned and unmanned space missions are summarized. The role of desynchronization in the process of adaptation to the space environment is emphasized. Measures that can be taken to minimize or prevent desynchronization are outlined. These include a rigorous selection procedure to identify individuals with high resistance to the negative effects of sleep loss, a program of pre-flight adaptation to the in-flight routine, and adaptation of relaxation techniques to be practiced in flight. Adoption of a 'space time' by the crew so that the hour is consistent with the flight routine, and adherence to this time scheme in all communications with the crew are suggested. C.K.D.

A77-35777 # Biomedical investigations on the problem of artificial gravity (Mediko-biologicheskie issledovaniia po probleme iskusstvennoi sily tiazhesti). A. R. Kotovskaia, R. R. Galle, and A. A. Shipov. *Kosmicheskaiia Biologiia i Aviakosmicheskaiia Meditsina*, vol. 11, Mar.-Apr. 1977, p. 12-19. 20 refs. In Russian.

Soviet and American space crews have been exposed to up to three months of weightlessness with no serious ill effects. However, in spite of the prophylactic measures taken in the Skylab program, certain disturbing trends such as a decrease in orthostatic stability were observed. The effects of these changes over prolonged periods are potentially dangerous. A review of the literature indicates that these harmful effects may be prevented by a simulated gravitational force equal to that of earth. An important area of research lies in establishing the minimum centripetal force required to avoid the deleterious effects of weightlessness and to insure normal work

capability during prolonged space missions. A series of experiments designed to determine this lower limit is outlined. C.K.D.

A77-35778 # Results of clinical examinations of cosmonauts after a 63-day flight (Rezultaty klinicheskogo obsledovaniia kosmonavtov posle 63-sutochnogo poleta). A. V. Beregovkin, T. N. Krupina, G. D. Syrykh, M. M. Korotaev, N. A. Kuklin, V. A. Balandin, V. S. Znamenskii, V. I. Nikiforov, and V. V. Nistratov. *Kosmicheskaiia Biologiia i Aviakosmicheskaiia Meditsina*, vol. 11, Mar.-Apr. 1977, p. 19-22. In Russian.

The cosmonauts P. I. Klimuk and V. I. Sevastyanov during their 63-day flight showed functional changes that were identical to those they demonstrated during their shorter flights. During the long-term mission they adapted to the weightless state better than previously. Post-flight medical examinations revealed no pathologies. The following functional changes were found: general asthenization and signs of vegetative-vascular intolerance, sensory-motor and stato-kinetic disorders, moderate muscular dystrophy of lower extremities, slight inhibition of erythropoiesis. P. I. Klimuk displayed vestibular disturbances postflight. Both cosmonauts recovered without any complications. (Author)

A77-35779 # Electrocardiograph examination of the crew of the second Salyut-4 expedition (Elektrokardiograficheskoe obsledovanie ekipazha vtoroi ekspeditsii 'Saliut-4'). M. M. Korotaev, I. I. Popov, V. A. Degtiarev, Z. Z. Dorofeeva, A. D. Egorov, V. V. Kalinichenko, S. I. Ponomarev, V. P. Sidorov, A. P. Poliakova, and Z. A. Golubchikova. *Kosmicheskaiia Biologiia i Aviakosmicheskaiia Meditsina*, vol. 11, Mar.-Apr. 1977, p. 22-26. In Russian.

Results of 12-lead electrocardiographs of members of the second Salyut-4 expedition taken during and after their 63-day flight are reported. No changes exceeding the range of normal fluctuations were observed. However, a trend towards decrease of the atrioventricular conduction and increase of the intraventricular conduction was noted, together with a decrease of the T voltage. Neither cosmonaut experienced any chest discomfort during the flight. The changes observed during the space flight appear to be the result of adaptation to changes in the position of the heart. However, because the fluctuations in the T voltage showed no clear correlation with positional changes, metabolic changes in the myocardium cannot be ruled out. C.K.D.

A77-35780 # Changes in hemodynamics and phasal structure of the cardiac cycle in the crew members of the Salyut-4 second expedition (Izmenenie gemodinamiki i fazovoi struktury serdchnogo tsikla u ekipazha vtoroi ekspeditsii 'Saliut-4'). V. G. Doroshev, T. V. Batenchuk-Tusko, N. A. Lapshina, Iu. A. Kukushkin, N. D. Kalmykova, and V. N. Ragozin. *Kosmicheskaiia Biologiia i Aviakosmicheskaiia Meditsina*, vol. 11, Mar.-Apr. 1977, p. 26-31. 12 refs. In Russian.

Medical examinations of the Salyut-4 crew members included bicycle ergometry tests. During the tests the heart rate and the time intervals of the left ventricle were measured. On the 46th flight day the arterial pressure, cardiac output and peripheral resistance were also determined. In the course of the 63-day flight responses to the 5 min workload of 2100-2200 kgm did not differ essentially from the preflight level and did not increase with the flight time. Circulation changes noted in zero-g and upon return to 1 g were similar and can be accounted for by a reduction of the circulating blood volume. During the first minutes after inflight exercise more marked changes in the cardiac output and cycle were detected. This can be attributed to a relatively stronger effect of blood pooling in working muscles on the venous return of the blood. On the 3rd postflight day the arterial pressure and the velocity of the aortal propagation of the pulse wave were higher. (Author)

A77-35781 # Dynamics of the venous circulation in cosmonauts of the Salyut-4 station (Dinamika venoznogo krovoobrascheniia u kosmonavtov vtoroi ekspeditsii 'Saliut-4'). E. M. Iuganov, V. A. Degtiarev, A. S. Nekhaev, T. V. Batenchuk-Tusko, E. A.

Kobzev, V. S. Bednenko, and S. V. Ivanova. *Kosmicheskaiia Biologiia i Aviakosmicheskaiia Meditsina*, vol. 11, Mar.-Apr. 1977, p. 31-37. 19 refs. In Russian.

During the first month of the orbital flight the cosmonauts showed an increase in blood pressure and filling in the jugular veins whereas during the second month they exhibited a decrease in these parameters below the preflight level. Throughout the mission the pressure in the pulmonary artery remained slightly increased. The time of contractions of the right chambers of the heart changed. The changes in the blood pressure and filling in the jugular veins can be explained by blood pooling there and subsequent extravasation of blood into the abdominal cavity. (Author)

A77-35782 # Evaluation of pulse rate dynamics in members of the second Salyut-4 crew at rest and during in-flight functional tests (Otsenka dinamiki chastoty pul'sa u chlenov vtorogo ekipazha 'Saliut-4' v pokoe i pri vypolnenii funktsional'nykh prob v polete). O. G. Itsekhovskii, A. P. Poliakova, and V. R. Liamin. *Kosmicheskaiia Biologiia i Aviakosmicheskaiia Meditsina*, vol. 11, Mar.-Apr. 1977, p. 37-42. In Russian.

A77-35783 # Prediction and analysis of the heart rate of cosmonauts by the method of extrapolation modelling in the class of differential equations (Prognozirovaniie i analiz chastoty pul'sa kosmonavtov metodom ekstrapolatsionnogo modelirovaniia v klasse differentsial'nykh uravnenii). V. K. Vasil'ev, A. A. Guev, A. B. Savvin, and Iu. M. Svirezhev. *Kosmicheskaiia Biologiia i Aviakosmicheskaiia Meditsina*, vol. 11, Mar.-Apr. 1977, p. 42-47. In Russian.

The use of the methods of the theory of automatic control and identification for predicting and analyzing the cardiovascular function of crewmembers in long-duration space missions is discussed. On the basis of the inflight heart rate data models characterizing the cardiovascular function can be built. The models have the form of linear differential equations of the second order and are used to calculate the heart rate. With respect to the parameters of the equations, the characteristics of cardiovascular regulation inflight are determined. The practical application of the above methods to predict and analyze the cardiovascular function of the crewmembers of the Soviet Salyut-1 and Salyut-4 and US Skylab 3 space stations is described. (Author)

A77-35784 # Results of studies of the metabolic processes in crew members of the second mission of the Salyut-4 orbital station (Rezultaty issledovaniia protsessov metabolizma u chlenov ekipazha vtoroi ekspeditsii orbital'noi stantsii 'Saliut-4'). R. A. Tigranian, I. A. Popova, M. I. Beliakova, N. F. Kalita, E. G. Tuzova, L. B. Sochilina, and N. A. Davydova. *Kosmicheskaiia Biologiia i Aviakosmicheskaiia Meditsina*, vol. 11, Mar.-Apr. 1977, p. 48-53. 22 refs. In Russian.

Detailed biochemical analyses were carried out on the venous blood and urine of crew members of the second Salyut-4 expedition. Significant decreases in the level of urea in the blood and urine were observed with respect to pre-flight levels. Changes in other indicators of nitrogen and protein metabolism fell within the normal range. Elevated levels of transaminase and alkaline phosphatase, probably due to stress, were found in the blood of one cosmonaut. As in earlier studies, an increase in uric acid in the blood associated with hypokinesia was observed. Most parameters returned to pre-flight levels by the seventh post-flight day. No adverse metabolic changes that would prevent prolonged manned space flights were observed. C.K.D.

A77-35785 # Effect of a 22-day space flight on rat lymph organs (Vliianie 22-sutochnogo kosmicheskogo poleta na limfoidnye organy krysa). G. N. Durnova, A. S. Kaplanskii, and V. V. Portugalov. *Kosmicheskaiia Biologiia i Aviakosmicheskaiia Meditsina*, vol. 11, Mar.-Apr. 1977, p. 53-57. 8 refs. In Russian.

The effect of a 22-day space flight on the lymph organs of rats was studied. The exposure produced hypoplasia of the lymph organs

and reduced the weight of the spleen and the thymus to the greatest extent. It was shown histologically, morphometrically and cytologically that hypoplasia of the spleen was associated with the decreased number of lymphocytes and erythrocytes, whereas hypoplasia of the thymus and lymph nodes was related to the diminished number of lymphocytes. Changes in the lymph organs of flight rats were reversible. The structure of lymph organs was restored by the 27th postflight day. Pathogenetic mechanisms of the changes in the lymph organs of rats due to space flight effects are discussed and the data are compared with the postflight medical examinations of cosmonauts. (Author)

A77-35786 # Intestinal autoflora of test subjects during a six-month bioengineering experiment (Autoflora kishechnika ispytatelei v usloviakh 6-mesiachnogo biologo-tekhnicheskogo eksperimenta). M. S. Rerberg, N. S. Manukovskii, and L. A. Somova. *Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina*, vol. 11, Mar.-Apr. 1977, p. 57-59. 15 refs. In Russian.

Changes in the intestinal flora of four subjects isolated in the Bios-3 closed life support unit were investigated over a period of six months. Marked fluctuations in the composition of different groups of intestinal microflora (sporogeneous anaerobes, lactic-acid bacteria, bifidobacteria, proteus, etc.) were observed, indicating that the Bios-3 unit is not completely satisfactory for prolonged use. In spite of instabilities in the composition of the intestinal microflora, the total number of microorganisms per gram of feces remained relatively unchanged. C.K.D.

A77-35787 # Rheographic study of the cardiovascular system of man during a lengthy exposure to a hyperbaric atmosphere (Reograficheskoe issledovanie serdechno-sosudistoi sistemy cheloveka v usloviakh mnogodnevnoy prebyvaniya pod vysokim davleniem). L. I. Ardashnikova and L. A. Chudnovskaya. *Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina*, vol. 11, Mar.-Apr. 1977, p. 60-64. 26 refs. In Russian.

A rheographic study of the cardiovascular system in a N2-O2 atmosphere at 5 ata showed significant changes in the regulation of the leg vascular tone of most test subjects at rest. The study did not reveal marked changes in the pulsed blood inflow to the brain and lungs at rest. After moderate and especially after heavy work changes in the blood inflow were more pronounced in the hyperbaric atmosphere than at 1 ata. During the exposure an increase in the vascular tone of the systemic and pulmonary circulation was noted. (Author)

A77-35788 # An evaluation of the effectiveness of muscle electrostimulation in preventing hypokinesia-induced disorders in man (Otsenka effektivnosti elektrostimulyatsii myshts v preduprezhdenii rassstroistv, svyazannykh s dlitel'nyim ogranicheniem dvigatel'noi aktivnosti cheloveka). M. A. Cherepakhin, L. I. Kakurin, E. I. Il'ina-Kakueva, and G. I. Fedorenko. *Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina*, vol. 11, Mar.-Apr. 1977, p. 64-68. In Russian.

The effectiveness of muscle electrostimulation alone or in combination with exercise as a prophylactic measure against deterioration due to prolonged hypokinesia was investigated. A strict bed regime with subjects' heads placed 4-6 deg below their feet, followed over a period of seven weeks, served to simulate the effects of weightlessness. Electrostimulation of muscles of the crus, hip, abdomen, and spine was carried out with the Tonus-2 apparatus. Electrostimulation of muscles increased their strength and tolerance to static loads, but did not prevent deconditioning of the cardiovascular system. When stimulation was used in combination with physical exercises, cardiovascular deconditioning was effectively prevented. When electrostimulation was carried out before the exercise period, an increase in the cross-sectional area of red and white muscle fibers was observed; post-exercise stimulation produced increases in the cross-sectional area of red muscle fibers, with both positive and negative fluctuations in that of white muscle fibers. C.K.D.

A77-35789 # An experimental study of the link between pulmonary blood flow, fluid-electrolyte metabolism, and orthostatic reactions in man (Eksperimental'naya otsenka svyazi mezhdu krovenapolneniem malogo kruga, sostoianiem vodno-solevogo obmena i ortostaticheskimi reaktsiyami u cheloveka). I. D. Pestov, Kh. Kh. Asanov, B. F. Asiamolov, V. A. Karpusheva, I. I. Kas'ian, V. S. Panchenko, and V. I. Stepantsov. *Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina*, vol. 11, Mar.-Apr. 1977, p. 68-74. In Russian.

A77-35790 # The sensitivity of animals to central nervous system stimulants (Chuvstvitel'nost' zhivotnykh k stimulyatoram tsentral'noi nervnoi sistemy pri gipokinezii). L. Ia. Kolemeeva, V. S. Shashkov, and B. B. Egorov. *Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina*, vol. 11, Mar.-Apr. 1977, p. 74-79. 11 refs. In Russian.

The effects of intraperitoneally injected central nervous system stimulants (caffeine, strychnine, and phenamine) on rats subjected to 1, 5, 10, 15, 30, 45 and 60 days of hypokinesia were investigated. Changes in LD (16), LD (50), and LD (84) and in the onset time and duration of reactions were observed. A significant increase in caffeine sensitivity was noted on the 5th, 15th and 45th days. Convulsions induced by strychnine appeared sooner in experimental animals than in controls; duration was dependent on dose. Adynamics in response to caffeine developed later in the experimental animals and its duration changed cyclically. Stereotype behavior resulting from the injection of phenamine also showed a cyclic pattern, and its duration was shorter in experimental animals than in controls. Although phenamine and related compounds were the strongest stimulants tested, their use in space flight is recommended only for a single application under emergency conditions. Caffeine seems to be the most suitable stimulant for general use in conditions of hypokinesia. C.K.D.

A77-35791 # Study of mechanical activity of skeletal muscles of dogs in vivo (Izuchenie mekhanicheskoi aktivnosti skeletnykh myshts sobak in vivo). V. G. Kozlova, V. S. Oganov, and A. S. Rakhmanov. *Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina*, vol. 11, Mar.-Apr. 1977, p. 79-83. 11 refs. In Russian.

Mechanical activity of gastrocnemius and plantaris muscles of dogs at different locomotion patterns was analyzed by the method of dynamomyography. Quantitative correlations between the strength parameters and electric activity of the muscles were studied. In walking and running the above muscles showed different types of contractions. This may be related to their morphological, anatomical and topographic features. The data obtained can be used to evaluate the state of skeletal muscles in different experimental models of a diminished motor activity. (Author)

A77-35792 # Portable transfer device for determining the static endurance of rats (Portativnoe perenosnoe ustroystvo dlia opredelenii staticheskoi vynoslivosti krysa). A. A. Shipov and A. S. Markin. *Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina*, vol. 11, Mar.-Apr. 1977, p. 83, 84. In Russian.

A77-35793 # Diffusion capacity of human lungs during the combined action of hypokinesia and hypoxia (Diffuzionnaya sposobnost' legkikh cheloveka pri kombinirovannom vozdeystvii gipokinezii i gipoksii). A. N. Kotov. *Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina*, vol. 11, Mar.-Apr. 1977, p. 85, 86. 11 refs. In Russian.

A77-35794 # Effect of dioxane on the functional condition of the central nervous system of rats (Vliyanie dioksana na funktsional'noe sostoianie tsentral'noi nervnoi sistemy krysa). G. I. Solomin. *Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina*, vol. 11, Mar.-Apr. 1977, p. 87-89. 6 refs. In Russian.

Since dioxane occurs in the atmospheres of pressurized spacecraft cabins, the effect of commonly-encountered concentrations of this substance was studied by determining the changes caused by dioxane on the motor chronaxie of muscular extension and contraction in rats. Rats were exposed to three concentrations of dioxane, 20, 4, and 0.5 mg/cu m, and chronaxie was determined at 20 day intervals up to 80 days. Dioxane did not affect rheobase, but did cause statistically significant changes in the ratio of the chronaxies for extension and contraction. These changes, considered a sign of weakened central nervous system control, were detected at the 40th and subsequent test days for the highest concentration, at the 60th and 80th day for the intermediate concentration, and not at all for the lowest concentration. It is concluded that 4 mg/cu m is a toxic concentration of dioxane. M.L.

A77-35817 * # Some physiological effects of alternation between zero gravity and one gravity. A. Graybiel (U.S. Naval Aerospace Medical Research Laboratory, Pensacola, Fla.). In: Space manufacturing facilities: Space colonies; Proceedings of the Princeton Conference, Princeton, N.J., May 7-9, 1975.

New York, American Institute of Aeronautics and Astronautics, Inc., 1977, p. 137-149. NASA Order T-5904-B.

The anatomy and physiology of the healthy vestibular system and the history of its study, maintenance of musculoskeletal fitness under low-gravity conditions, tests of motion sickness, and data and techniques on testing subjects in a slow rotation room, are covered. Components of the inner ear labyrinth and their behavior in relation to equilibrium, gravity and inertial forces, motion sickness, and dizziness are discussed. Preventive medicine, the biologically effective force environment, weightlessness per se, activity in a weightless spacecraft, exercising required to maintain musculoskeletal function, and ataxia problems are dealt with. R.D.V.

A77-35919 Illusory displacement of a moving trace with respect to the grid during oscilloscope motion. D. E. Parker, D. L. Woods, and R. L. Tubbs (Miami University, Oxford, Ohio). *Perception and Psychophysics*, vol. 21, no. 5, May 1977, p. 439-444. Contract No. F33615-73-C-4002.

Observers report that a trace streak, which follows a sinusoidal path, moves vertically with respect to the oscilloscope's grid when an oscilloscope is oscillated in the vertical plane. The vertical component of the trace streak motion with respect to the grid is illusory. This illusion is stable across a limited range of illumination and physical motion conditions. We hypothesize that this illusion is based on the manner in which the visual system calculates the vertical location of the grid and the trace: the trace location is determined on a moment-to-moment basis, whereas the grid tends to be seen in its average vertical position. The results of two experiments indicate that this hypothesis can account, at least partially, for the illusion. The illusion may have practical implications for pilots or navigators who track target blips on radar screens in moving aircraft. (Author)

A77-36093 # Changes in monoamine oxidase activity and in the temperature dependence of oxidative disamination of serotonin in the brain during hibernation (Izmenenie aktivnosti monoaminoksidazy i temperaturnoi zavisimosti oksilitel'nogo dezaminirovaniia serotoninina golovnogo mozga vo vremia zimnei spiachki). N. N. Vitenko (Akademiya Nauk SSSR, Institut Tsitologii i Genetiki, Novosibirsk, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 63, Mar. 1977, p. 359-364. 12 refs. In Russian.

A77-36094 # The effect of acute hypothermia on the composition of mitochondria lipids of the myocardia of warm-blooded animals (Vliianie ostroi gipoterмии na sostav lipidov mitokhondrii miokarda teploкровnykh zhivotnykh). A. P. Shepelev (Gosudarstvennyi Meditsinskii Institut, Rostov-on-Don, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 63, Mar. 1977, p. 442-447. 17 refs. In Russian.

A77-36176 # Some quantitative effects of long-term fractionated irradiation in the seminiferous epithelium in mice. T. Rudnicki (Akademia Medyczna, Poznan, Poland). *Artificial Satellites*, vol. 12, Jan. 1977, p. 3-10. 10 refs.

A77-36182 # Biology and medicine. Z. Sarol. *Artificial Satellites*, vol. 12, Jan. 1977, p. 42-52. 19 refs.

A number of recent Polish studies in the field of space biology are reviewed. Attention is given to the effects of increased gravitational force on the organism, the effects of motor activity restriction on adaptation to prolonged exercise, prolonged hypokinesia, hypoxia tolerance, hypercapnia, biorhythms, and radiobiological effects. B.J.

A77-36189 Mutation and inactivation of mammalian cells by various ionising radiations. R. Cox, J. Thacker, D. T. Goodhead, and R. J. Munson (Medical Research Council, Radiobiology Unit, Harwell, Oxon, England). *Nature*, vol. 267, June 2, 1977, p. 425-427. 24 refs.

The reported investigation shows for two cell types that the maximum mutagenic effectiveness of the considered radiations, relative to X or gamma rays, is about twice that for inactivation. Preliminary experiments suggest that specific chromosome aberrations may be associated with mutations induced by radiations involving high linear energy transfer. Data concerning mutation and inactivation of human and hamster cells by ionizing radiations are presented in a table. G.R.

A77-36198 Reduction in inspiratory activity in response to sternal vibration. J. G. Colebatch, S. C. Gandevia, and D. I. McCloskey (New South Wales, University, Kensington, Australia). *Respiration Physiology*, vol. 29, May 1977, p. 327-338. 11 refs. Research supported by the National Health and Medical Research Council of Australia.

The article deals with effects of 100 Hz longitudinal sternal vibration in reducing tidal volume (TV) and prolonging inspiratory time (IT) such that points from vibrated and nonvibrated breaths fall on the same TV vs IT curve. Normal respiration-terminating mechanisms are shown to be unaffected by the vibration. But the vibration does reduce inspiration rate, with a reduction in the rate of fall of intrapleural pressure during inspiration and a reduction in instantaneous ventilation at any level of chemical drive. Confirmation is provided by electrophysiological traces taken from phrenic motoneurons. Vibrationally excitable sensory nerves in the chest wall are shown to inhibit inspiration. R.D.V.

A77-36199 The relation between hypoxia and CO₂-induced reflex alternation of breathing in man. S. A. Ward (Liverpool, University, Liverpool, England) and D. J. C. Cunningham (Oxford University, Oxford, England). *Respiration Physiology*, vol. 29, May 1977, p. 363-378. 42 refs.

A77-36200 Separation of the inspiratory and expiratory reflex effects of alternate-breath oscillation of pA CO₂ during hypoxia. S. A. Ward (Liverpool, University, Liverpool, England) and D. J. C. Cunningham (Oxford University, Oxford, England). *Respiration Physiology*, vol. 29, May 1977, p. 379-390. 31 refs. Research supported by the Medical Research Council.

The article examines reflex response patterns in the case of variable volumes, flows, and durations on the part of four healthy young men and women undergoing mild exercise (58 runs) while receiving alternate inspirates of low and high alveolar pCO₂ (pA CO₂) during hypoxia. Phase relations between the alternating pA CO₂ and reflex outputs (mean inspiratory and expiratory flows, reciprocal expiration time) were determined via cross-correlation analysis. The pA O₂ was held steady at more than one level between 6 and 9.6 kPa while the pA CO₂ oscillated between roughly 6 and 7.5 kPa. The influence of peripheral chemoreceptors on expiratory events independently of inspiration is inferred from the results. R.D.V.

A77-36223 # A study on evaluation of the thermal radiation effect - Mean radiant temperature weighted with the absorption factor. T. Mochida and K.-I. Ibamoto (Hokkaido University, Sapporo, Japan). *Hokkaido University, Faculty of Engineering, Memoirs*, vol. 14, Dec. 1976, p. 1-13. 7 refs.

One of the elements influencing thermal sensation is the surrounding wall temperature, and up to the present, average radiant temperatures weighted with area ratio and with angle factor have been used in such investigations. The present authors investigated this fact and at the same time, by extending and developing Gebhart's absorption factor, a new concept of average radiant temperature was derived, which includes the emissivity of each wall in addition to angle factors between the human body and the surrounding walls. The average radiant temperature takes into consideration the heat balance in addition to the geometric position relation to the human body in a room and the surrounding walls.

(Author)

A77-36553 * A life sciences Spacelab mission simulation. J. A. Mason, F. S. Musgrave, and D. R. Morrison (NASA, Johnson Space Center, Houston, Tex.). In: *Space shuttle missions of the 80's; Proceedings of the Twenty-first Annual Meeting*, Denver, Colo., August 26-28, 1975. Part 2. San Diego, Calif., American Astronautical Society, 1977, p. 1000-1002. (AAS 75-258)

The paper describes the purposes of a seven-day simulated life-sciences mission conducted in a Spacelab simulator. A major objective was the evaluation of in-orbit Spacelab operations and those mission control support functions which will be required from the Payload Operations Center. Tested equipment and procedures included experiment racks, common operational research equipment, commercial off-the-shelf equipment, experiment hardware interfaces with Spacelab, experiment data handling concepts, and Spacelab trash management.

M.L.

A77-36557 Glare recovery of various colors with respect to a two-dimensional tracking task. D. A. Boyer (U.S. Army, Aviation Systems Command, St. Louis, Mo.). *SAFE Journal*, vol. 7, Summer 1977, p. 6-8. 8 refs.

The research reported here shows that blue-lighted instrument panels for aircraft significantly decreased error rate in a tracking task after exposure to short duration glare. A carefully installed experiment was designed to investigate four different color illumination sources for a simulated instrument panel (a CRT which displayed the target and reference points) using five subjects in a randomized block experiment. The tracking task used a moving dot on a CRT as the stimulus with a joystick to control the dot. The joystick and dot were coupled through a hybrid EAI Computer which also supplied random motion and collected error data.

(Author)

A77-36558 A study of PFT /parasail/ in air training command. G. W. Hall (USAF, Office of the Surgeon, Randolph AFB, Tex.). *SAFE Journal*, vol. 7, Summer 1977, p. 10-13. 11 refs.

Injuries to pilots following egress from disabled aircraft can be minimized by their ability to maneuver their parachute during descent and to execute a proper parachute landing fall. USAF pilot and navigator trainees receive extensive ground training in parachute operation and parachute landing falls. They then undergo Parachute Familiarization Training (PFT) during which they experience descents by a parasail after being towed to altitude. The value of PFT was determined by evaluating questionnaires sent to approximately 700 crewmembers, including many ex-prisoners of war, who had made an emergency egress. Areas addressed included contribution of the training to overall confidence, ability to steer the parachute to avoid hazardous obstacles, execution of a proper parachute landing fall, and the role of PFT in avoiding injury or fatality in the post-egress environment. Responses indicated that PFT played a significant role in confidence-building and in avoiding or minimizing post-egress injury.

(Author)

A77-36564 The provision and use of information on Air Traffic Control displays. I. V. D. Hopkin (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). (*AGARD, NATO, Symposium on Plans and Developments for Air Traffic Systems*, Cambridge, Mass., May 19-23, 1975.) *The Controller*, vol. 15, May 1976, p. 18-22. 7 refs.

Mismatches between human operator and computer display/computer operation and ways of detecting such human-machine system deficiencies in systems evaluation are discussed at length. Provision and display of information is distinguished from the information actually usable by the controller. Inadvertent omission of (usually qualitative) information in automation attempts, incomplete automation with the information displayed or assumed (suppressed) presenting unfamiliar problems to the human operator, computer-assisted decision making where the human operator is not fully aware of how and why the machine reached or altered a decision, and common ergonomic problems in design of teamwork, workplace layout and design, and design of relative timing, sequencing, and concurrent actions are covered.

R.D.V.

A77-36600 Mitral-septal separation - New echocardiographic index of left ventricular function. B. M. Massie, N. B. Schiller, R. A. Ratshin, and W. W. Parmley (California, University, San Francisco, Calif.). *American Journal of Cardiology*, vol. 39, June 1977, p. 1008-1016. 27 refs. Grant No. NIH-HL-06285.

A77-36717 Data compression for storing and transmitting ECG's/VCG's. M. E. Womble, M. C. Lancaster, J. H. Triebwasser (USAF, School of Aerospace Medicine, Brooks AFB, Tex.), J. S. Halliday (Eurotherm, Ltd., Worthing, Sussex, England), and S. K. Mitter (MIT, Cambridge, Mass.). *IEEE, Proceedings*, vol. 65, May 1977, p. 702-706. 32 refs.

A data compression technique implementable with either a mini- or microcomputer yields a compression ratio slightly better than 12 to 1 for cardiograms. The technique involves two applications of the discrete Karhunen-Loève expansion, intrinsic components, principal factors, or principal components, all synonyms. The first application reduces the effects of respiration and the various orientations of different patients' hearts, and requires the solution of a 3×3 matrix eigenvalue, eigenvector problem for each beat. The second application involves expressing the transformed cardiogram in a Karhunen-Loève series, and requires the solution of the eigenvalue, eigenvector problem for a large matrix. The solution, which must be obtained only once for all time, can be performed off line. Cardiograms reconstructed from the compressed data are compared with the original cardiograms.

(Author)

A77-36718 The origin and characterization of the primary signal, noise, and interference sources in the high frequency electrocardiogram. R. F. Santopietro (U.S. Naval Material Command, Naval Underwater Systems Center, New London, Conn.). *IEEE, Proceedings*, vol. 65, May 1977, p. 707-713. 23 refs.

A77-36719 Microprocessor application for numerical ECG encoding and transmission. M. Bertrand, R. Guardo, F. A. Roberge, and P. Blondeau (Ecole Polytechnique; Montréal, Université, Montréal, Canada). *IEEE, Proceedings*, vol. 65, May 1977, p. 714-722. 11 refs. Research supported by the National Research Council of Canada.

Computer-aided interpretation of the operational characteristics of digital ECG communication are discussed. The article reviews encoding methods proposed in the literature, and describes a prototype system employing an 8-bit microprocessor. Real-time transmission of 3 encoded ECG leads, sampled at 300/sec/lead and digitized with 8-bit resolution using a 2400Bd synchronous MODEM on standard (unconditioned) telephone lines is featured.

R.D.V.

A77-36720 * The detection and analysis of point processes in biological signals. D. J. Anderson and M. J. Correia (Texas, University, Galveston, Tex.). *IEEE, Proceedings*, vol. 65, May 1977, p. 773-780. 23 refs. Contract No. NAS9-14641.

A pragmatic approach to the detection and analysis of discrete events in biomedical signals is taken. Examples from both clinical and basic research are provided. Introductory sections discuss not only discrete events which are easily extracted from recordings by conventional threshold detectors but also events embedded in other information carrying signals. The primary considerations are factors governing event-time resolution and the effects limits to this resolution have on the subsequent analysis of the underlying process. The analysis portion describes tests for qualifying the records as stationary point processes and procedures for providing meaningful information about the biological signals under investigation. All of these procedures are designed to be implemented on laboratory computers of modest computational capacity. (Author)

A77-36721 A computerized technique to record new components of the electrocardiogram. E. J. Berbari, B. J. Scherlag, and R. Lazzara (U.S. Veterans Administration Hospital; Miami, University, Miami, Fla.). *IEEE, Proceedings*, vol. 65, May 1977, p. 799-802. 15 refs. Grant No. NIH-HL-15872.

A77-36722 A statistical approach to rhythm diagnosis of cardiograms. D. E. Gustafson (Scientific Systems, Inc., Cambridge, Mass.), A. S. Willsky, J.-Y. Wang (MIT, Cambridge, Mass.), M. C. Lancaster, and J. H. Triebwasser (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *IEEE, Proceedings*, vol. 65, May 1977, p. 802-804.

A new method is presented for detection and classification of arrhythmias in electrocardiograms on the basis of R-R interval data. A set of phenomenological models for both persistent and transient rhythms is developed to match observed statistical variations. Arrhythmias are identified by calculating statistical probabilities and likelihoods associated with these models using two recently developed techniques. The important system design considerations are described. Finally, representative results using actual arrhythmia data are presented to illustrate the system performance. (Author)

A77-36723 A new practical lead system for vector magnetocardiography. J. A. V. Malmivuo (Tampere University of Technology, Tampere, Finland) and J. P. Wikswo, Jr. (Stanford University, Stanford, Calif.). *IEEE, Proceedings*, vol. 65, May 1977, p. 809-811. 5 refs. NSF Grant No. APR-72-03447A03.

This letter describes a new lead system for vector magnetocardiography. Numerical calculations, electrolytic tank studies, and data from normal subjects show that the output of this lead system corresponds closely to the Magnetic Heart Vector described by Baule and McFee, gives good signal quality and is easy to use. (Author)

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STAR ENTRIES

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THE EFFECT OF COLONIZATION BY ANIMAL AND PLANT ORGANISMS ON ASPHALT STRUCTURES IN SEA WATER

Claus D. Mueller 20 Dec. 1976 18 p refs Transl. into ENGLISH from Bitumen (West Ger.), no. 5, 1966 p 142-147 (BLL-CE-Trans-6946-(9022.09)) Avail: British Library Lending Div., Boston Spa, Engl.

The effect of marine organisms on asphalt was examined. Consideration was given to those structures which, in the tidal zone, are either covered or washed each day by water. Experiments were performed with asphalts of various compositions. The effect animals and plants forming colonies on asphalt in sea water have on the substrate was studied. Only the occurrence of mechanical changes and effects which can be detected with the naked eye were examined. The effect the level in the tidal zone has on the possibility of the creatures or plants forming the colonies was previewed. Author

N77-24755* National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Tex.

WATER SYSTEM VIRUS DETECTION Patent Application
 A. S. Fraser (Organon Diagnostics, El Monte, Calif.), A. F. Wells (Organon Diagnostics, El Monte, Calif.), and H. J. Tenoso, inventors (to NASA) (Organon Diagnostics, El Monte, Calif.) Filed 28 Apr. 1977 19 p
 (Contract NAS9-14102)

(NASA-Case-MSC-16098-1; US-Patent-Appl-SN-792068) Avail: NTIS HC A02/MF A01 CSCL 06A

A waste-water reclamation system is monitored by introducing a non-pathogenic marker virus, bacteriophage F2, into the waste water prior to treatment and, thereafter, testing the reclaimed water for the presence of the marker virus. A test sample is first concentrated by adsorbing any marker virus onto a cellulose acetate filter in the presence of a trivalent cation at low pH and then flushing the filter with a limited quantity of a glycine buffer solution to desorb any marker virus present on the filter. Photo-optical detection of indirect passive immune agglutination by polystyrene beads indicates the performance of the water reclamation system in removing the marker virus. A closed system provides for concentrating any marker virus, initiating and monitoring the passive immune agglutination reaction, and then flushing the system to prepare for another sample. NASA

N77-24756* Istituto Superiore di Sanita, Rome (Italy). Lab. di Fisica.

AN EPR STUDY OF X-RAY IRRADIATED SERUM METALLO-PROTEINS

M. Bomba, S. Cannistraro, and P. L. Indovina 3 Jan. 1976 31 p refs In ITALIAN; ENGLISH summary Submitted for publication (ISS-P-76/1) Avail: NTIS HC A03/MF A01

A review on ceruloplasmin is presented, in particular on the several kinds of copper ions bound to the protein. The results of an EPR study performed on human serum samples, frozen at 77 K and X-ray-irradiated, are reported. The results seem to indicate that the copper in an EPR non-detectable state, the presence of which has been demonstrated, is available under the form of strongly interacting Cu++ pairs. ESA

N77-24757* Scientific Translation Service, Santa Barbara, Calif.
PROBLEMS OF SPACE BIOLOGY. VOLUME 33: GRAVITY AND THE BODY

N. P. Dubinin, ed. Washington NASA Apr. 1977 309 p refs Transl. into ENGLISH of the book "Problemy kosmicheskoy biologii. Tom 33: Gravitatsiya i Organizm", Moscow, Nauka Press, 1976 p 1-287
 (Contract NASw-2791)
 (NASA-TT-F-17526) Avail: NTIS HC A14/MF A01 CSCL 06P

The role of research, development, and demonstration (RD and tics of plants and animals and its significance in the development and realization of hereditary information is discussed. The monograph will be useful both for researchers working in the area of gravitational biology and for biologists and doctors interested in the effect of gravity on vital activity. Author

N77-24758* Amerind Publishing Co. Pvt. Ltd., New Delhi (India).

RUSSIAN LITERATURE ON AVIATION, SPACE AND HIGH-ALTITUDE BIOLOGY AND MEDICINE: A BIBLIOGRAPHY. VOLUME 2

A. A. Sergeyev Washington NASA Jun. 1977 675 p ref Transl. into ENGLISH from the book "Otechestvennaya literatura po aviatsionnoy, vysokogornoy i kosmicheskoy biologii i meditsina, vyp. 2", Leningrad, Nauka Press, 1974 p 1-177
 (Contract NSF C-630)
 (NASA-TT-F-16119; TT-75-52043) Avail: NTIS HC A99/MF A01 CSCL 06D

This volume presents 4,415 reference to Russian domestic documents, published in the years 1967 to 1971 inclusively, devoted to specific problems in the fields of aviation, space and high-altitude biology and medicine. There is a subject index consisting of 67 categories. Author

N77-24759* National Research Inst. for Mathematical Sciences, Pretoria (South Africa).

A MYOCYBERNETIC CONTROL MODEL OF SKELETAL MUSCLE

H. Hatze Aug. 1976 47 p refs
 (WISK-220) Avail: NTIS HC A03/MF A01

A mathematical model of skeletal muscle is presented which contains the two physiological control parameters stimulation rate and motor unit recruitment. The modelling procedure relies entirely on established myo-physiological facts and each assumption made is substantiated by experimental data. Extensive simulation studies reveal that the model is capable of correctly predicting practically all known phenomena of the muscular force-output. A simplified version of the model is also presented, particularly suitable for inclusion as the driving structure in complex musculoskeletal link systems. This version was successfully tested in the prediction of an optimal human motion. Author

N77-24760* Berkeley Scientific Translation Service, Calif.

PHENOMENA ASSOCIATED WITH ULTRASONIC PROPAGATION IN BIOLOGICAL SYSTEMS: HARMFUL ULTRASONIC EFFECTS

R. Zana Jul. 1976 24 p refs Transl. into ENGLISH from Biomedicine (France), v. 20, 1974 p 273-280
 (Contract W-7405-eng-48)
 (UCRL-Trans-11116) Avail: NTIS HC A02/MF A01

Thermal effects, cavitation and acoustic microstreaming are the three main effects associated with the propagation of ultrasound in fluids. After considering the physical origin of these effects, the modifications that they can bring in biological media (biomacromolecular solutions, cell suspensions, tissues) are reviewed. Recent studies of ultrasonic threshold dosages for the induction of adverse effects in cells and tissues are described. They conclude that ultrasound dosages used in medical diagnostics are innocuous. ERA

N77-24761* Oak Ridge National Lab., Tenn.

EFFECTS OF CTR IRRADIATION ON THE MECHANICAL PROPERTIES OF STRUCTURAL MATERIALS

F. W. Wiffen Nov. 1976 39 p refs

(Contract W-7405-eng-26)

(ORNL/TM-5624) Avail: NTIS HC A03/MF A01

Mechanical properties of CTR structural materials are important in determining the reliability and economics of fusion power. Furthermore, these properties are significantly affected by the high neutron flux experienced by components in the regions near the plasma of the fusion reactor. In general, irradiation hardens the material and leads to a reduction in ductility. An exception to this is in some complex engineering alloys where either hardening or softening can be observed depending on the alloy and the irradiation conditions. Regardless of this restriction, irradiation usually leads to a reduction in ductility. Available tensile data examined show that significant ductility reduction can be found for irradiation conditions typical of CTR operation. Consideration of these effects shows that extensive work will be needed to fully establish the in-service properties of CTR structures. ERA

N77-24762# Battelle Pacific Northwest Labs., Richland, Wash.
POTENTIAL SOURCES FOR THE RADIATION TREATMENT OF FOOD

W. E. Sande and R. A. Libby Aug. 1976 31 p refs

(Contract E(45-1)-1830)

(BNWL-2095) Avail: NTIS HC A03/MF A01

A major consideration in the design of large-scale economical food irradiation systems is the radiation source. The 'traditional' gamma radiation source, Co60, is presently produced by the irradiation of Co59 in nuclear reactors. In addition, other radioisotopes with appropriate characteristics for food irradiation systems are presently available or may be available in the future. These radioisotopes are certain waste fission products formed in nuclear reactor fuel during operation. These materials may be separated after the fuel is discharged from the reactor. For example, Cs137 formed in Hanford reactors is presently being produced in an encapsulated form at the Waste Encapsulation and Storage Facility at Hanford, Washington. The use of Co60 Cs137 and other potential radiation sources is discussed from the standpoint of supply systems, characteristics of the isotopes, encapsulated forms, quantities available, timing of availability, and economics. ERA

N77-24763# Cincinnati Univ., Ohio. Dept. of Engineering Analysis.

NUMERICAL PREDICTION OF HEAD/NECK RESPONSE TO SHOCK-IMPACT

J. C. Huston (Iowa State Univ., Ames), C. E. Passerello, and R. L. Huston 1 Aug. 1976 14 p refs

(Contracts N00014-76-C-0139; PHS-NS-42302)

(AD-A034683) Avail: NTIS HC A02/MF A01 CSCL 06/19

A three-dimensional, 54 deg of freedom computer model of the head/neck system is presented. The model consists of a series of rigid bodies representing the bones and vertebrae together with springs and dampers representing the muscles, discs, ligaments, and joints. Equations of motion are written for the model by using Lagrange's form of d'Alembert's principle. Computer algorithms are developed to numerically calculate the coefficients of these equations. The governing equations are then integrated numerically for a number of specific cases. The results agree very well with experimental data. Author (GRA)

N77-24764# Dayton Univ., Ohio. Research Inst.
EVALUATION OF SAFE EXPOSURE GUIDELINES FOR MODERATE AND HIGH INTENSITY CONTINUOUS NOISE
Technical Report, 1 Feb. - 31 Jul. 1976

Thomas R. Schori Nov. 1976 147 p refs

(Contract F33615-75-C-5055; AF Proj. 6231)

(AD-A034605; AMRL-TR-76-97) Avail: NTIS HC A07/MF A01 CSCL 06/19

The TTS2 (temporary threshold shift measured two minutes after noise termination) consequences of brief noise exposures were systematically evaluated. Specifically, forty subjects were tested at each of 10 appropriately spaced noise exposure levels.

The 90th percentile TTS2 at 4000 Hz was determined for each exposure level and then a multiple regression equation was fitted to these values. From this equation, a 5 dB equal 90th percentile TTS2 curve was calculated, which represents the author's predictions as to the trade-offs between noise intensity and exposure duration necessary to produce 90th percentile TTS2s of 5 dB. A comparison of the author's predictions to those of the Environmental Protection Agency (EPA) (in the area of uncertainty) suggests that the conservative EPA predictions may be too conservative while the EPA's modified and extended National Research Council Committee on Hearing, Bioacoustics, and Biomechanics (CHABA) criterion predictions may not be sufficiently conservative. Although the author's predictions reflect the trends which were actually observed in the present investigation, it would be unreasonable to assume that the author's predictions are more than 'ball park' estimates of reality. GRA

N77-24765# National Bureau of Standards, Boulder, Colo. Electromagnetics Div.

MEASUREMENT OF RF POWER-ABSORPTION IN BIOLOGICAL SPECIMENS (10 TO 100 MHz) Final Report, 1 Jan. - 1 Oct. 1976

Frank M. Greene Nov. 1976 33 p refs

(PB-263101/8; NBS-TN-687) Avail: NTIS HC A03/MF A01 CSCL 06R

The RF power being absorbed by a biological specimen during non-ionizing radiation-exposure testing using the NBS RF Near-Field Synthesizer in the frequency range 10 to 100 MHz was determined. The method is based solely on measuring the forward and reflected power on the transmission line feeding the synthesizer. The method has the advantage that the exact measuring point on the feed line is not critical, as it is with methods employing direct impedance measurements, and that the required measurements are made without interfering with the exposure tests. GRA

N77-24766*# Kanner (Leo) Associates, Redwood City, Calif.
PROBLEMS OF CREATING BIOTECHNICAL SYSTEMS OF HUMAN LIFE SUPPORT

I. I. Gitel'zon, ed. Washington NASA Apr. 1977 347 p refs

Transl. into ENGLISH of the book "Problemy Sozdaniya Biologiko-tehnicheskikh Sistem Zhizneobespecheniya Cheloveka" Novosibirsk, Nauka Press, 1975 p 1-272

(Contract NASw-2790)

(NASA-TT-F-17533) Avail: NTIS HC A15/MF A01 CSCL 06K

Various aspects of the cultivation of higher plants as a possible link of a biological life support system, including experiments with various higher plants, their radiation sensitivity, and cultivating equipment, are presented. Various aspects of the cultivation of single celled algae as the regeneration link in a life support system, including studies of photosynthesis, morphology, physiology, nutrition including treated solid human waste and other sources of nutrients, and methods and techniques of continuous cultivation of single celled algae, primarily Chlorella, are presented. The use of nonphotosynthesizing microbe cultures, especially the microflora and microfauna of activated sludge, for biological mineralization of human wastes and Chlorella metabolites are discussed. Author

N77-24767*# Honeywell, Inc., Minneapolis, Minn. Systems and Research Center.

EXPLORATION OF AN OCULOMETER-BASED MODEL OF PILOT WORKLOAD

Marjorie J. Krebs, James W. Wingert, and Thomas Cunningham Mar. 1977 121 p refs

(Contract NAS1-13092)

(NASA-CR-145153; Honeywell-76-SRC/39) Avail: NTIS HC A06/MF A01 CSCL 05E

Potential relationships between eye behavior and pilot workload are discussed. A Honeywell Mark IIA oculometer was used to obtain the eye data in a fixed base transport aircraft simulation facility. The data were analyzed to determine those parameters of eye behavior which were related to changes in

level of task difficulty of the simulated manual approach and landing on instruments. A number of trends and relationships between eye variables and pilot ratings were found. A preliminary equation was written based on the results of a stepwise linear regression. High variability in time spent on various instruments was related to differences in scanning strategy among pilots. A more detailed analysis of individual runs by individual pilots was performed to investigate the source of this variability more closely. Results indicated a high degree of intra-pilot variability in instrument scanning. No consistent workload related trends were found. Pupil diameter which had demonstrated a strong relationship to task difficulty was extensively re-examined.

Author

N77-24768*# Martin Marietta Corp., Denver, Colo.
PROTO-FLIGHT MANIPULATOR ARM (P-FMA) Final Report

W. R. Britton Apr. 1977 119 p
 (Contract NAS8-31487)
 (NASA-CR-150277; MCR-77-201) Avail: NTIS
 HC A06/MF 01 CSCL 05H

The technical development of the Proto-Flight Manipulator Arm (P-FMA) which is a seven-degree-of-freedom general-purpose arm capable of being remotely operated in an earth orbital environment is discussed. The P-FMA is a unique manipulator, combining the capabilities of significant dexterity, high tip forces, precise motion control, gear backdriveability, high end effector grip forces and torques, and the quality of flightworthiness. The 2.4-meter (8-foot) arm weighs 52.2 kilograms (115 pounds).

Author

N77-24769*# Telephonics, Huntington, N.Y.
EVALUATION OF LIGHTWEIGHT HEADSETS FOR SPACE SHUTTLE APPLICATION Final Technical Report

Oct. 1976 75 p
 (Contract NAS9-14824)
 (NASA-CR-151265) Avail: NTIS HC A04/MF A01 CSCL 05H

Contemporary lightweight headsets were evaluated for: intelligibility, frequency response, sensitivity, distortion, noise isolation, acoustic quality, weight, and wearer comfort. Author

N77-24770# Royal Aircraft Establishment, Farnborough (England).

FEATURES OF THE SPEECH SIGNAL DURING THE CUMULATIVE ACTIONS OF CORIOLIS ACCELERATIONS
 A. V. Nikonov and F. A. Solodounik Nov. 1976 8 p refs
 Transl. into ENGLISH from Voenno-Med. Zh. (USSR), v. 7, 1972 p 78-81
 (RAE-Ub-Trans-1909; BR55708) Avail: NTIS
 HC A02/MF A01

Possible variations of the acoustic characteristics of a speech signal caused by the cumulative action of Coriolis accelerations and subsequent nausea in the subject were investigated. Results indicate that for short exposures of up to 1 minute of Coriolis' accelerations, the speech intensity is raised by 1 to 2dB and the basic tone frequency increases significantly. However during the onset of nausea, the speech intensity falls below the initial value by 1 to 2dB and the basic tone frequency is reduced.

Author

N77-24771*# National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.
ELECTRIC DISCHARGE FOR TREATMENT OF TRACE CONTAMINANTS Patent Application

Daniel L. Flamm (Stanford Univ., Calif.) and Theodore J. Wydeven, Jr., inventors (to NASA) Filed 23 May 1977 19 p
 (NASA-Case-ARC-10975-1; US-Patent-Appl-SN-799832) Avail: NTIS HC A02/MF A01 CSCL 06K

A radio-frequency glow discharge reactor for removing trace contaminants from an oxygen bearing atmosphere including a reaction chamber defined by an inner metal electrode facing a dielectric backed by an outer conductive electrode was considered. In one embodiment, a conductive liquid forms the conductor of an outer electrode and cools the dielectric. A resonator coupled

to a variable radio-frequency source generates the high voltages for creating a glow discharge in the chamber at a predetermined pressure whereby the trace contaminants are oxidized into a few simple non-toxic products that may be easily recovered.

NASA

N77-24772*# National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Tex.

NASA FIREFIGHTERS BREATHING SYSTEM PROGRAM REPORT

William B. Wood Washington May 1977 73 p refs
 (NASA-TN-D-8497; JSC-S-465) Avail: NTIS
 HC A04/MF A01 CSCL 05H

Because of the rising incidence of respiratory injury to firefighters, local governments expressed the need for improved breathing apparatus. A review of the NASA firefighters breathing system program, including concept definition, design, development, regulatory agency approval, in-house testing, and program conclusion is presented.

Author

N77-24773# Army Aeromedical Research Lab., Fort Rucker, Ala.

AVIATOR PERFORMANCE DURING DAY AND NIGHT TERRAIN FLIGHT Final Report

Michael A. Lees, Kent A. Kimball, Mark A. Hofmann, and Lewis W. Stone Nov. 1976 33 p refs
 (AD-A034898; USAARL-77-3) Avail: NTIS HC A03/MF A01 CSCL 17/7

Terrain flying, both day and night, is now an Army aviation tactical requirement. The present investigation compared terrain flight during Low Level (LL) and Nap-of-the-Earth (NOE) profiles for: (1) day flight with the unaided eye; (2) night flight with the unaided eye; and (3) night flight using night vision goggles. Data were acquired through use of the Helicopter In-Flight Monitoring System (HIMS). The total sets of inflight measures were analyzed separately for both LL and NOE with further analysis on the subsets of pilot control variables and aircraft status variables. Multiple discriminant analysis techniques were used to determine which measures best discriminated between visual conditions. For the LL flight profiles, the results indicate that performance factors describing air speed and the frequency of small control inputs best discriminated between visual conditions. For NOE flight profiles, it was determined that performance factors measuring severity of roll angles, and the frequency and magnitude of control input, best discriminated between the three visual conditions.

Author (GRA)

N77-24774# National Highway Traffic Safety Administration, Washington, D. C. Safety Research Lab.

ANALYSIS OF COMFORT AND CONVENIENCE FACTORS IN IMPROVED RESTRAINT SYSTEMS Final Technical Report, Jul. - Nov. 1976

Stephen-Gordon, Akira-Kondo, and David-Breedon -Dec.-1976- 65 p refs
 (PB-263157/0; DOT-HS-802-113) Avail: NTIS
 HC A04/MF A01 CSCL 13F

Six occupant restraint systems (both current production and prototype) were evaluated in terms of comfort and convenience by 30 subjects. A paired comparison statistical procedure was developed that considers each subject as an independent control factor and, therefore, eliminated personal bias. The modified Seville was significantly better than the other systems. The modified Volare, standard Volare, and Impala rated in the upper to middle category. The Rabbit and Chevette ranked as the worst systems tested. Smoothness, repeatability, and comfortable tension in the shoulder belt retractor appeared to be the most important factors influencing comfort and convenience.

GRA

N77-24775# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

PERFORMANCE OF THE HUMAN PERIPHERAL VISUAL SYSTEM UNDER VARIOUS LOADS M.S. Thesis

Daniel R. Burchfield Dec. 1976 142 p refs
(AD-A034270; GE/EE/76-16) Avail: NTIS HC A07/MF A01 CSCL 05/5

This report measured the effects of single and multiple spatial presentations in various positions in the human peripheral visual field. Subjects fixated on a central point and attempted to accurately discern orientations of peripherally located stimuli. The peripheral tasks were sine-wave gratings generated on HP-120 5A oscilloscopes. Stimuli were presented at various positions along the horizontal and vertical axes of the visual field. Stimulus presentation times were 20, 50, 100, and 500 msec. Lateral differences in perception were noted with the data showing high statistical significance. The number of events processed also proved to be a significant variable. The dominance of the right cerebral hemisphere for processing spatial information was very evident. Such results have strong implications as to where spatial presentations should be located in the visual field to maximize visual performance. GRA

N77-24776# Honeywell, Inc., Minneapolis, Minn. Systems and Research Center.

HEADLIGHT FACTORS AND NIGHTTIME VISION Final Report, Jun. 1974 - Aug. 1976

Carl P. Graf Nov. 1976 102 p refs
(PB-262507/2; HONEYWELL-76-SRC/13; DOT-HS-802102) Avail: NTIS HC A06/MF A01 CSCL 13F

The feasibility of using information concerning driver scan pattern data in the analysis of headlamp effectiveness was examined. The driver-subjects were unaware that their eye movements were being recorded. Eighteen subjects drove over rural two-lane roads with indigenous targets under daytime conditions and six headlight configurations. The major independent variables included headlamp type, target type and reflectivity, road geometry, and glare versus no-glare. Dependent measures were average dwell point, scan pattern distribution, and target detection distance. GRA

N77-24777# Calspan Corp., Buffalo, N.Y.

PERFORMANCE EVALUATION OF THE NHTSA ADVANCED S SERIES 50TH PERCENTILE ANTHROPOMORPHIC DUMMY. VOLUME 1: TECHNICAL REPORT Final Report, Jun. 1975 - Jul. 1976

Daniel E. Massing and Phyllis E. Yates Nov. 1976 293 p refs
(Contract DOT-HS-5-01260)
(PB-262672/9; CALSPAN-ZS-5778-Vol-1; DOT-HS-802073-Vol-1) Avail: NTIS HC A13/MF A01 CSCL 13L

The two series anthropomorphic test dummies were experimentally evaluated to: (1) determine the degree of conformance to specifications for dimensions, segment weights, and joint range of motion, (2) to compare measured component static and dynamic characteristics to requirements, and (3) to establish by sled testing in typical restraint and crash environments their experimental repeatability. Four 30 MPH sled test configurations were employed, type 2 belt, air bag, energy absorbing steering column, and simulated instrument panel with Type 1 belt. The findings of a statistical study of repeatability and reproducibility of experimental results are presented. A thin film piezoelectric pressure sensor was evaluated. GRA

N77-25769* National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va.

PROCESS FOR CONTROL OF CELL DIVISION Patent

Clarence D. Cone, Jr., inventor (to NASA) Issued 19 Apr. 1977 10 p Filed 17 Oct. 1975 Continuation of abandoned US Patent Appl. SN-314656 and US Patent Appl. SN125235, filed 13 Dec. 1972 and 17 Mar. 1971

(NASA-Case-LAR-10773-3; US-Patent-4,018,649; US-Patent-Appl-SN-623238; US-Patent-Class-195-1.8; US-Patent-Appl-SN-314656; US-Patent-Appl-SN-125235) Avail: US Patent Office CSCL 06C

A method of controlling mitosis of biological cells was developed, which involved inducing a change in the intracellular ionic hierarchy accompanying the cellular electrical transmembrane potential difference (Esubm) of the cells. The ionic hierarchy may be varied by imposing changes on the relative concentrations of Na(+), K(+), and Cl(-), or by directly imposing changes in the physical Esubm level across the cell surface. NASA

N77-25770# Oak Ridge National Lab., Tenn.

PARAMETRIC STUDY AND PRELIMINARY EVALUATION OF REVERSE OSMOSIS FOR SEAWATER DESALINATION

P. Glueckstern, S. A. Reed, and J. V. Wilson Nov. 1976 51 p refs

(Contract W-7405-eng-26)

(ORNL-TM-5231) Avail: NTIS HC A04/MF A01

One- and two-stage reverse osmosis (RO) systems for seawater desalination was studied with the aid of a recently developed computer program for optimization of RO systems. Membrane manufacturer's performance data and predicted cost data were applied. A preliminary evaluation of the economics of RO for seawater desalination was made based on these data and other equipment and operating costs considered. Plant capacities in the range of 1 to 12.5 Mgd were considered and compared economically with the current most common multistage flash distillation process at different energy price levels. ERA

N77-25771# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bad Godesberg (West Germany). Inst. fuer Flugmedizin.

ELECTRON MICROSCOPE INVESTIGATIONS OF THE EFFECT OF FIVE-DAY WEIGHTLESSNESS SIMULATION ON THE DEVELOPMENT OF THE FROG EMBRYO (RANA TEMPORARIA) VESTIBULAR ORGAN

Juergen Neubert, Wolfgang Briegleb, and Albrecht Schatz 7 Dec. 1976 37 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-397) (DLR-FB-76-66) Avail: NTIS HC A03/MF A01; DFVLR, Cologne, DM 17

Results of experiments with fertilized frog eggs which developed under conditions of five days simulated weightlessness are described. The tests were designed to determine if there is any effect on the ability of the eggs to divide normally and on subsequent differentiation especially of the gravity receptor located in the vestibular organ. The submicroscopic structure of the macula utriculi (sensory epithelium) was compared between test and control animals. No abnormalities could be detected in the morphological structure. The results were compared with those of comparable experiments at zero g (Soyuz 10, Biosatellite 2, Gemini 8 and 12) and very good agreement was noted. Indications are given for future experimental steps to obtain more clarity concerning the function of the gravity organ under conditions of simulated and real weightlessness. These experiments should be histo- and cytochemical ones. Author (ESA)

N77-25772* National Aeronautics and Space Administration, John F. Kennedy Space Center, Cocoa Beach, Fla.

MAGNETIC ELECTRICAL CONNECTORS FOR BIOMEDICAL PERCUTANEOUS IMPLANTS Patent

Lester J. Owens, inventor (to NASA) Issued 31 May 1977 5 p Filed 30 Jul. 1976 Supersedes N77-15617 (15 - 06, p 0789)

(NASA-Case-KSC-11030-1; US-Patent-4,025,964; US-Patent-Appl-SN-709849; US-Patent-Class-3-1; US-Patent-Class-128-1R; US-Patent-Class-339,12R) Avail: US Patent Office CSCL 06B

A biomedical percutaneous connector is described which includes a socket having an enlarged disk shaped base portion for being implanted below the patient's skin and cylindrical portion which is integral with the base portion and extends outwardly of the skin. A conical recess in an upper end of the cylindrical portion has a magnet located in the base. Inclined conductive strips are carried on an upper end of the cylindrical portion to which electrical conductors are attached and extend into the patient's body. A complementary shaped plug which also has electrical contacts provided thereon is adapted to fit within the

conical recess of the socket. The plug is held in the socket by magnetic force. Official Gazette of the U.S. Patent Office

N77-25775* IIT Research Inst., Chicago, Ill. Techno/Economic Study Group.

MARKET STUDY: WHOLE BLOOD ANALYZER

[1977] 113 p

(Contract NASw-2837)

(NASA-CR-153254) Avail: NTIS HC A06/MF A01 CSCL 06D

A market survey was conducted to develop findings relative to the commercialization potential and key market factors of the whole blood analyzer which is being developed in conjunction with NASA's Space Shuttle Medical System. Author

N77-25776* California Univ., Davis.

MODIFICATION OF OS CALCIS BONE MINERAL PROFILES DURING BEDREST

John Max Vogel 1977 12 p refs

(Contract NAS9-13589)

(NASA-CR-151421) Avail: NTIS HC A02/MF A01 CSCL 06S

The mineral content of the left central os calcis was determined using the photon absorptiometric technique modified for the space missions to permit area scanning, and was compared with total body calcium balance changes. The instrument consists of a rectilinear scanner that is programmed by a specially designed control module to move a low energy X-ray emitting radionuclide placed in opposition to a detector to scan the foot which is placed between them. The foot is placed in a plexiglas box filled with water to provide tissue equivalence and to compensate for irregularities in thickness of tissue cover that surrounds the bone. The mineral content is obtained from basic attenuation equation. Author

N77-25777* Interuniversitair Reactor Instituut, Delft (Netherlands).

CALCULATION OF THE DEPOSITION OF POLYDISPERSE AEROSOLS IN THE GLASS MODELS OF THE UPPER HUMAN AIRWAYS. DESCRIPTION OF THE COMPUTER PROGRAM

G. A. Ferron Sep. 1976 14 p refs

(IRI-190-76-02) Avail: NTIS HC A02/MF A01

The deposition was calculated with the solutions for deposition by sedimentation and diffusion from a laminar airflow in the circular cylindrical tubes of Thomas, Gromley, and Kennedy equations. The polydispersity of the aerosol is taken into account in the computer program. The results obtained using this computer program are compared with the experimental deposition measured in the glass model. ESA

N77-25778* Medical Physics Inst. Utrecht (Netherlands).

[RESEARCH ACTIVITIES IN APPLICATION OF PHYSICS AND ENGINEERING TO MEDICAL SCIENCE AND PROBLEMS] Progress Report

B. VanEijnsbergen, ed. and F. L. LopesdaSilva, ed. Dec. 1976 210 p refs

(TNO-MFI-PR-5) Avail: NTIS HC A10/MF A01

Activities are reported in the form of short articles. The fields of interest dealt with are: development of aids and appliances for the bodily handicapped, cardiovascular physics, brain research, cybernetics, physiological signal processing, medical instrumentation, and lung mechanics. ESA

N77-25779* Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

COMPUTER IDENTIFICATION OF PREMATURE VENTRICULAR CONTRACTIONS IN ELECTROCARDIOGRAMS M.S. Thesis

John P. DiTucci Dec. 1976 84 p refs

(AD-A035285; GE/EE/76-22) Avail: NTIS HC A05/MF A01 CSCL 06/5

Algorithms to locate and identify premature ventricular contractions (PVC's) in single lead electrocardiograms are developed and evaluated on twelve 100 second electrocardiogram

recordings. The location algorithms detect waveforms which are either QRS complexes or PVC's. The identification algorithms are then used to classify the waveforms as QRS complexes, PVC's, or premature beats. QRS and PVC classification is based on the evaluation of linear combinations of low frequency Walsh transform coefficients for each located waveform. Premature beat classification is based on a rhythm analysis. Of 1397 QRS complexes evaluated, 1386 or 99.21% were classified correctly. GRA

N77-25780* School of Aerospace Medicine, Brooks AFB, Tex. **EFFECTS OF CONTAMINATED SUPPLY AIR ON PURITY OF BREATHING OXYGEN GENERATED BY FLUOMINE Progress Report, Jun. 1975 - Jan. 1976**

Leonard J. Luskus and Herman J. Kilian Dec. 1976 14 p refs

(AF Proj. 7930)

(AD-A035745; SAM-TR-76-42)

Avail: NTIS

HC A02/MF A01 CSCL 06/11

Air used to supply oxygen to the fluomine bed of a model Open Loop Oxygen Generating System (OLOGS) was adulterated with various contaminants to study their effect on performance of the fluomine. chemical and purity of the oxygen product. Contaminants investigated were water, carbon dioxide, carbon monoxide, benzene, n-heptane, ethanol, acetone, acetaldehyde, Freon 12, and nitrogen dioxide. No deleterious effect on fluomine chemical was observed at the contaminant concentration used during short-term testing. Oxygen purity was affected to various extent by the different contaminants. Carbon monoxide, carbon dioxide, and nitrogen dioxide did not accumulate in the oxygen product. Water concentrated to 5%. The organic contaminants accumulated up to 8 times their concentration in the supply air. Nitrogen dioxide was the only contaminant irreversibly absorbed by the fluomine. Odor was present in the oxygen product when odorous organic contaminants were present in the supply air. The authors concluded that the fluomine beds need protection from excessive water, N-oxide and organic contamination to avoid oxygen of unacceptable quality and possible accelerated fluomine degradation. GRA

N77-25781* Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abt. Instrumentierung und Anthropotechnik.

PRACTICAL UTILITY OF CRITICAL FLICKER FUSION FREQUENCY MEASUREMENTS TO ASSESSMENT OF MENTAL WORKLOAD

Fred Volker Schick 14 Dec. 1976 39 p refs In GERMAN; ENGLISH summary Prepared jointly with Tech. Univ. Brunswick Report will also be announced as translation (ESA-TT-398) (DLR-FB-76-67) Avail: NTIS HC A03/MF A01; DFVLR, Cologne, DM 19.10

Two experiments were conducted to evaluate the utility of an advanced measuring device, coupled with a practicable measurement procedure, with respect to reliable and valid assessment of mental workload by measuring critical flicker fusion frequency (CFF). In the first experiment, basic variability of CFF scores, obtained from 11 subjects under nonworkload conditions, was studied. Error of measurement as well as physical and psychical interference variables were discussed to be sources of the large oscillations actually observed from data. It was found necessary to modify the measurement procedure. In the second experiment 10 subjects' CFF thresholds were examined. Statistical analysis revealed generally low reliability coefficients. Also thresholds failed to discriminate between low workload and high workload treatments. Results suggest that the magnitude of threshold's fluctuations due to individual physical and psychical interferences exceed threshold's alterations due to treatments. Author (ESA)

N77-25782* Naval Postgraduate School, Monterey, Calif.

THE DESIGN, CONSTRUCTION, AND IMPLEMENTATION OF A SIMULATED PILOT'S TASK TO BE USED IN THE STUDY OF THE EFFECTS OF EEG BIOFEEDBACK M.S. Thesis

Douglas Pierce Ayers Sep. 1976 56 p refs

(AD-A035884) Avail: NTIS HC A04/MF A01 CSCL 06/5

A brief history of the EEG and a physiological explanation of the possible causes of EEG waveforms is given. A highly reliable simulated pilot's tasking system is designed and explained in detail. An analog circuit to produce a voltage equal to the square root of the sum of two input voltages squared is designed to be used as a measure of effectiveness of EEG biofeedback. A discussion of present and future data analysis programs is presented. Author (GRA)

N77-25783* IIT Research Inst., Chicago, Ill. Techno/Economic Studies Group.

MARKET STUDY: 3-D EYETRACKER

20 May 1977 82 p refs
(Contract NASw-2837; IITRI Proj. H6046-H28)
(NASA-CR-153253) Avail: NTIS HC A05/MF A01 CSCL 05H

A market study of a proposed version of a 3-D eyetracker for initial use at NASA's Ames Research Center was made. The commercialization potential of a simplified, less expensive 3-D eyetracker was ascertained. Primary focus on present and potential users of eyetrackers, as well as present and potential manufacturers has provided an effective means of analyzing the prospects for commercialization. Author

N77-25784* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

SPACESUIT TORSO CLOSURE Patent Application

Bruce W. Webbon and Hubert C. Vykukal, inventors (to NASA)
Filed 23 Mar. 1977 17 p
(NASA-Case-ARC-11100-1; US-Patent-Appl-SN-780569) Avail: NTIS HC A02/MF A01 CSCL 06Q

A simple, economical and reliable entry closure is described for joining opposite halves of a torso section for a pressure suit in a manner which simplifies self-donning. A single coupling joins coaxially aligned, axially separable, tubular segments of a hard spacesuit along an angulated zone of separation, adapted to be mated in an hermetically sealing relation. A C section clamp secures the members in their mated relationship. NASA

N77-25785* Massachusetts Inst. of Tech., Cambridge. Man-Vehicle Lab.

RESEARCH ON INTEGRATION OF VISUAL AND MOTION CUES FOR FLIGHT SIMULATION AND RIDE QUALITY INVESTIGATION Final Report, Jun. 1972 - Feb 1977

L. R. Young, C. M. Oman, and R. E. Curry 15 Jun. 1977 84 p refs
(Grant NGR-22-009-701)
(NASA-CR-153249) Avail: NTIS HC A05/MF A01 CSCL 05H

Vestibular perception and integration of several sensory inputs in simulation were studied. The relationship between tilt sensation induced by moving fields and those produced by actual body tilt is discussed. Linearvection studies were included and the application of the vestibular model for perception of orientation based on motion cues is presented. Other areas of examination includes visual cues in approach to landing, and a comparison of linear and nonlinear wash out filters using a model of the human vestibular system is given. B.B

N77-25786* Essex Corp., Huntsville, Ala.
EARTH ORBITAL TELEOPERATOR MOBILITY SYSTEM EVALUATION PROGRAM

Ronald G. Brye, Nicholas L. Shields, Jr., and Mark Kirkpatrick, III 28 Jan. 1977 34 p refs
(Contract NAS8-31848)
(NASA-CR-150285; H-77-4; Rept-1) Avail: NTIS HC A03/MF A01 CSCL 05H

The proximity translation and final docking of the space teleoperator evaluation vehicle (STEV) with large mass and small mass satellites was studied. Operations that may be performed by the STEV during the shuttle experiments are approximated. Author

N77-25787* Essex Corp., Huntsville, Ala.
EARTH ORBITAL TELEOPERATOR MANIPULATOR SYSTEM EVALUATION PROGRAM

Ronald G. Brye, P. Norman Frederick, Mark Kirkpatrick, III, and Nicholas L. Shields, Jr. 29 Jan. 1977 59 p refs
(Contract NAS8-31848)
(NASA-CR-150286; H-77-2; Rept-4) Avail: NTIS HC A04/MF A01 CSCL 05H

The operator's ability to perform five manipulator tip movements while using monoptic and stereoptic video systems was assessed. Test data obtained were compared with previous results to determine the impact of camera placement and stereoptic viewing on manipulator system performance. The tests were performed using the NASA MSFC extendible stiff arm Manipulator and an analog joystick controller. Two basic manipulator tasks were utilized. The minimum position change test required the operator to move the manipulator arm to touch a target contract. The dexterity test required removal and replacement of pegs. Author

N77-25788* Essex Corp., Huntsville, Ala.
EARTH ORBITAL TELEOPERATOR VISUAL SYSTEM EVALUATION PROGRAM

P. Norman Frederick, Nicholas L. Shields, Jr., and Mark Kirkpatrick, III 28 Jan. 1977 120 p refs
(Contract NAS8-31848)
(NASA-CR-150287; H-77-3; Rept-5) Avail: NTIS HC A06/MF A01 CSCL 05H

Visual system parameters and stereoptic television component geometries were evaluated for optimum viewing. The accuracy of operator range estimation using a Fresnell stereo television system with a three dimensional cursor was examined. An operator's ability to align three dimensional targets using vidicon tube and solid state television cameras as part of a Fresnell stereoptic system was evaluated. An operator's ability to discriminate between varied color samples viewed with a color television system was determined. Author

N77-25789* Life Systems, Inc., Cleveland, Ohio.
EVALUATION OF A SPACECRAFT NITROGEN GENERATOR Annual Report

R. D. Marshall and W. J. Knebel Jan. 1977 41 p refs
(Contract NAS2-8732)
(NASA-CR-151983; LSI-ER-251-10-2; AR-2) Avail: NTIS HC A03/MF A01 CSCL 06K

An experiment was completed to demonstrate that low ammonia concentrations in the product nitrogen stream are possible using the staging concept. Mixtures of nitrogen, hydrogen and ammonia were fed into a temperature controlled packed bed ammonia dissociator. An ammonia concentration of 1.03% in the feed stream was reduced to less than 50 ppm at temperatures greater than or equal to 777K. The actual inlet ammonia concentration to the final nitrogen generation module ammonia dissociation stage was only 0.09%. Author

N77-25790* Naval Air Development Center, Warminster, Pa. Crew Systems Dept.

THE EFFECT OF VIRTUAL IMAGE PROJECTION DISTANCE ON THE ACCOMMODATIVE RESPONSE OF THE EYE

Gloria Twine Ehisum and Phyllis E. Morway 4 Feb. 1977 27 p refs
(AD-A036136; NADC-77017-40) Avail: NTIS HC A03/MF A01 CSCL 19/5

Virtual image displays utilize either aircraft mounted or helmet mounted beam splitters, or combining screens. The effect on the accommodative response of the projection distance of the virtual image was measured by photographing the first and fourth Purkinje images of a source. The results indicate possible effect on the accommodation response. Further explanation of the problem is indicated. Author (GRA)

N77-25791* Human Resources Research Organization, Alexandria, Va.

LONG-TERM RETENTION OF FLYING SKILLS: AN ANNOTATED BIBLIOGRAPHY Final Report, 1 May - 15 Sep. 1976

Wallace W. Prophet Oct. 1976 144 p refs
(Contract F44620-76-C-0106)
(AD-A036114; HumRRO-FR-ED(P)-76-36) Avail: NTIS
HC A07/MF A01 CSCL 05/9

In support of USAF Saber Wings II study, a survey of the state of behavioral science knowledge with reference to long-term retention of flying skills was conducted. Various literature sources were surveyed, as well as selected agencies and knowledgeable individuals. Abstracts or annotated references are presented for 120 references. Literature is grouped as: flight skill retention studies; non-flight skill retention studies; miscellaneous aviation studies; and literature reviews and references. Abstract length varies from three pages to a single paragraph. An additional 80 references are given as reviewed, but not pertinent.

Author (GRA)

N77-25792# Wayne State Univ., Detroit, Mich. Dept. of Industrial Engineering.

VEHICLE EYE REFERENCING DATA Final Report, Dec. 1975 - Sep. 1976

R. R. Maurant and R. G. Arbogast Nov. 1976 95 p ref
(Contract DOT-HS-6-01301)

(PB-262821/2) Avail: NTIS HC A05/MF A01 CSCL 13F

Research to determine drivers' eye locations in various vehicles is reviewed. Driver eye position data were collected for fifty subjects as they drove a standard sedan and a van truck. For both vehicle types comparisons were made between data collected in a laboratory buck, a static vehicle, and in a moving vehicle. Eye position data was collected to enable comparisons of the data as a function of vehicle package geometry. In particular, the closeness of the compact car's structure to the driver's body may restrict movement and thus result in smaller eyellipses.

GRA

N77-25793# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

THE SCALING PROBLEM IN VISUAL PATTERN RECOGNITION M.S. Thesis

Douglas D. Carpenter Dec. 1976 122 p refs

(AD-A035290; GE/EE/76D-17) Avail: NTIS
HC A06/MF A01 CSCL 06/4

The human pattern recognition system has been modeled as a system utilizing a low-pass, spatially-filtered, Fourier transform to represent input patterns and stored prototypes. This model is used to infer the existence of possible mechanisms underlying the scale invariant aspect of the human pattern recognition system. Two hypotheses are suggested: scaling (size normalization) of input patterns, or the storage of multiple-prototypes based on size. Experiments are carried out to distinguish between the two mechanisms. It is concluded that both mechanisms are utilized at different levels within the visual process. A revised model is developed to adequately account for the experimental results.

Author (GRA)

N77-25794# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Computer Science.

ANALYSIS OF LANGUAGES FOR MAN-MACHINE VOICE COMMUNICATION Interim Report Ph.D. Thesis - Stanford Univ.

Robert Gary Goodman Sep. 1976 173 p refs
(Contract F44620-73-C-0074; ARPA Order 2446)

(AD-A035564; AFOSR-77-0055TR) Avail: NTIS
HC A08/MF A01 CSCL 05/7

This dissertation describes a general model for the analysis of languages for man-machine communication. It is the first known study of ambiguity at all levels of recognition and represents the best analytical tool, to date, for the design of languages. The model unifies the concepts of ambiguity and restriction done by expressing each as a branching factor-a notion which is easily understood and visualized. Ambiguity increases the branching factor while restriction reduces it. Using branching factor has the advantage that an effective search space size may be computed for any language. Further, since ambiguity and syntactic restriction are expressed in a uniform way, the effect of one with respect to the other may be evaluated by considering search space reduction ratios. The model is useful for comparing the relative

complexities faced by speech understanding systems. Effective vocabulary size provides a way of measuring the complexity in isolated word recognition while effective search space size measures language complexity. Thus, the performance of 2 systems may be contrasted by using these measures previously, this could be done only if the 2 systems had been tested using the same data, a situation which occurred rarely GRA

N77-25795# Naval Research Lab., Washington, D. C.
NRL'S CENTRAL ATMOSPHERE MONITOR PROGRAM

F. E. Saalfeld and J. R. Wyatt Dec. 1976 48 p refs

(AD-A035774; NRL-MR-3432) Avail: NTIS HC A03/MF A01
CSCL 13/10

To meet the operational requirement of having submarines remain submerged for periods up to 90 days, it is necessary to have a pure atmosphere for the survivability of the crew. This requires some method for analyzing the submarine atmosphere. The current system under development, CAMS-II, will use a computer-controlled scanning mass spectrometer. Therefore, any compound that is introduced into the submarine's atmosphere can, in principle, be monitored by only a program change in the computer. CAMS-II also uses an infrared detector to monitor CO. The CAMS-IIB, an integrated life support system, is the last stage of the CAMS program. If CAMS-II is as reliable as CAMS-I, the CAMS-II computer system will be expanded to control the entire life support system of the submarine. For example, in the CAMS-IIB system, when the oxygen concentration decreases the CAMS-IIB computer automatically increases the oxygen concentration of the submarine to the desired level by adjusting the oxygen generator output. Similarly the CAMS-IIB will control the CO2 scrubber, monitor the carbon bed status for contaminant breakthroughs, and adjust the temperature of the CO/H2 catalytic burner. Thus, with the CAMS-IIB system, it will be possible to reduce the crew needed to support the submarine life support system and also to improve the quality of the atmosphere available on the submarine. GRA

N77-25796# Rockwell International Corp., Columbus, Ohio. Aircraft Div.

SEA BASED AIRCRAFT HABITABILITY CRITERIA Technical Report, 17 Aug. - 15 Oct. 1976

James D. Aurand 15 Oct. 1976 58 p refs

(Contract N00600-76-C-1606)

(AD-A035341; NR76H-113) Avail: NTIS HC A04/MF A01
CSCL 01/3

This report defines sea based aircraft habitability criteria including vertical, lateral (horizontal) and roll limits for on-water operations. Heating, ventilation, air conditioning, illumination, and volume limits are also indicated. Representative aircraft on-water motions are indicated and compared to motion sickness limits. No serious habitability limitations were uncovered for the surface following sea based aircraft concept. This report is a supplement to AD A035 344. GRA

N77-25797# Human Engineering Labs., Aberdeen Proving Ground, Md.

A HUMAN FACTORS EVALUATION OF A VERTICAL-SCALE INSTRUMENT DISPLAY SYSTEM FOR THE OV-1D AIRCRAFT Final Report

Harry R. Stowell and Alan M. Poston Jan. 1977 51 p refs
(AD-A036050; HEL-TM-4-77) Avail: NTIS HC A04/MF A01
CSCL 01/4

Because of the increased importance of conserving aircraft instrument-panel space, vertical-scale instrument displays are being given greater consideration. In an effort to identify any potential problems associated with vertical-scale instrument displays, a human-factors evaluation was performed on the production prototype of the vertical-scale instrument display for the OV-1D. Some of the factors considered in the investigation include light distribution, spectral analysis, impact on dark adaptation, high-ambient conditions, and night-vision-goggle compatibility. Recommendations have been made with respect to the light distribution and marking sizes. Author (GRA)

N77-25798# Grumman Aerospace Corp., Bethpage, N.Y.
**CREWMANS RETENTION SYSTEM FOR PROTECTION
AGAINST HIGH SPEED EJECTION UP TO 600 KNOTS Final
Engineering Report, Feb. - Oct. 1976**

Jerry Guarracino, Stanis Coryell, and Robert Delvecchio Oct.
1976 246 p refs

(Contract N62269-76-C-0082)

(AD-A036898; NADC-76119-40)

Avail: NTIS

HC A11/MF A01 CSCL 06/19

It can be firmly stated that a real-world problem exists in that crewman are being injured and survival equipment is being damaged during high speed ejections. This report covers the following areas of work conducted to define, investigate, analyze, and select devices to provide crewman protection against the forces of up through a 600 knot open escape seat ejection.

GRA

N77-25799*# Stanford Research Inst., Menlo Park, Calif.
**METHODOLOGY FOR BACK-CONTAMINATION RISK
ASSESSMENT FOR A MARS SAMPLE RETURN MISSION
Final Report**

M. W. Merkhofer and D. J. Quinn Apr. 1977 121 p refs
Prepared for JPL

(Contracts NAS7-100; JPL-954546; SRI Proj. 5534)

(NASA-CR-153251) Avail: NTIS HC A06/MF A01 CSCL
03B

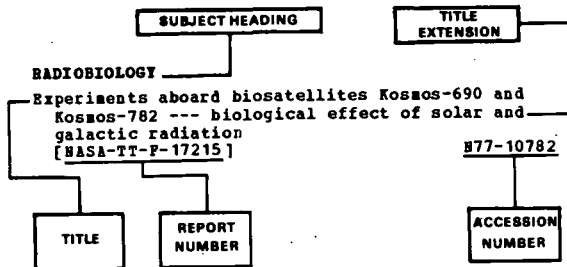
The risk of back-contamination from Mars Surface Sample Return (MSSR) missions is assessed. The methodology is designed to provide an assessment of the probability that a given mission design and strategy will result in accidental release of Martian organisms acquired as a result of MSSR. This is accomplished through the construction of risk models describing the mission risk elements and their impact on back-contamination probability. A conceptual framework is presented for using the risk model to evaluate mission design decisions that require a trade-off between science and planetary protection considerations. Author.

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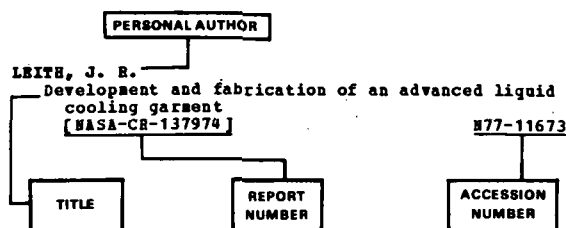
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